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The Problems of the Manufacturer

SURELY by now everybody who reads these pages fully realises the urgency of Britain's proceeding with the expansion of electricity supply to the full limit in the interests of the supply industry itself.

It must be made available for everybody who wants it at as low a price as possible, because of its inherent merits, which destine it to touch life and industry beneficially at every conceivable point. The opportunity and responsibility for doing this rest with what we call the Undertakings and those who personally decide or control their policy.

The requirements of the public and the prosperity of the undertakings, however, are far from being the only serious points that interest those who have at heart the present and future of the electrical profession and industry. The well-being of British electrical manufacturing is a matter which ought to concern us all. Electricity supply men will do well to look at things from the standpoint of the manufacturer, upon whom they must ever depend for the efficient equipment of their systems and for the material which enables them to keep pace with the changing needs of both generation and distribution.

Some of the difficulties that are being faced by those who own our electrical factories and works were touched upon last week in the address of Mr. G. L. Wates, the chairman of Johnson & Phillips, Ltd.

The false economy agitation, so consistently condemned here for its adverse effect upon electricity supply development, came at a time when reduction of orders by public and other authorities operated simultaneously with further falls in the prices of raw materials. Electro-industrial concerns found themselves within the vicious circle of reduced turnover, reduced values, reduced percentage of profit, and relatively greater expense in securing business. Efforts are being made to stimulate spending, but, as Mr. Wates pointed out, it is far easier to stop the flow of expenditure than to set it running again. From the manufacturer's point of view, the solution of present problems lies in increase of turnover.

The outstanding fact in the present situation is this: if distributors of electrical energy will put in hand forthwith the many development schemes that have been prepared and are waiting to be proceeded with, business will immediately revive. In very many areas the cables laid are those which were originally put down for a relatively small lighting load. They will not suffice to allow the householder to install electric fires or domestic appliances, for which there is almost a public clamour. There is plenty of cheap money available, raw materials are lower in price than they have been for years—surely, then, there could be no better time for ordering additional cables.

Many other interesting points deserving of study were advanced by Mr. Wates. The necessity for producing a larger variety of goods, so that when some lines suffer severely it may be possible to gain on the swings what is lost on the roundabouts, has been faced by other concerns. The extreme competition that ensues from the excess productive capacity of cables and plant is also a familiar point.

But, after considering all these and other matters of a similar nature, there remains fixed in the thought the greatest immediate need, namely, the placing of new business on an enterprising scale by the electricity supply undertakings.

The Hot Water Campaign

THE publicity literature issued by E.D.A. in connection with the electric water-heating campaign ought to be in the hands of every electricity supply employé who comes into touch with the public. We hope that this well-planned effort will be supported and utilised by supply undertakings with far greater enthusiasm than they displayed over last year's electric cooking campaign. The effort will extend from May to July, and will consist mainly of display advertisements in the daily and Sunday newspapers, and in magazines. Though water heating is an all-the-year-round load, the subject is expected to make a strong appeal in the early summer,

when the desire to abandon the inconvenient heat and smother of the coal or coke fire is strongest. The smaller householder is regarded as being particularly susceptible to such an appeal, though for larger houses and in flats electricity possesses special merits. The scheme, and the pamphlets issued by E.D.A. in connection with it, also the broadcasting arrangements, are particularised in our "Business Notices." We hope that we shall hear of undertakings all over the country suitably timing their own local campaigns to the E.D.A. "push," so that everybody will be up to the neck in electric hot water for the next three months.

Practical Guidance

THE article by Mr. W. Jervis, of the Northmet Co., fits in very well with the new E.D.A. Campaign, and it should provide valuable ammunition for the salesman in approaching builders and architects—to say nothing of the owners of existing houses. The author shows how simple a matter it is to convert an existing system to all-electric working or, if desired, to a combination of coal and electricity. The article contains some useful tips on the actual installation work, for from his experience in the water-heater field Mr. Jervis has discovered a number of matters which must be attended to if success is to be achieved, as well as many "snags" which have to be avoided. One of his points is particularly worth keeping in mind: it is that the "man with the grouse" does more harm than a satisfied customer does good. We are certain that this applies more cogently to electricity in the home than to any other application, especially when the disgruntled one is a woman.

The End in Sight?

IT was stated at a recent meeting of the Council of the Electrical Contractors' Association that "a state of finality was being approached" in the deliberations of Committee "D" which was set up by the Electricity Commissioners some six years ago to settle a trading policy for the industry. A draft policy has been circulated to the bodies whose representatives form the Committee, and the Committee (it is said) has held its last meeting. This is not the first draft policy which has been produced; Mr. A. G. Beaver mentioned at the Wholesalers' dinner in February that the Committee was working on Draft No. 8—presumably the one now issued. If the Committee is to hold no more meetings and this draft policy proves unacceptable to some sections of the industry what happens next?

No I.E.E. Summer Meeting

THE proposal to hold a summer meeting of the Institution of Electrical Engineers in the Western Centre has been abandoned owing to lack of support. The venue would have been a delightful one for the purpose, and is easily reached by road and rail; also the Centre has had experience of organising similar functions. So the lack of enthusiasm among members cannot be attributed to local considerations. There are many people who cannot afford the time to attend this as well as other conferences which also provide a basis of serious work. If they do go the time spent has often to be deducted from their summer vacation, and the professional tincture makes it something of a busman's holiday. While we sympathise with the organisers in the disappointment they must feel at the apparent lack of appreciation of their efforts, we cannot altogether regret that another sectional convention has been eliminated, thus assisting the trend towards the one big National Electrical Convention.

The Railways

SPEAKING at the eightieth dinner of the London Association of Engineers, Mr. Alan Chorlton, M.P. (president of the Institution of Mechanical Engineers), referred to the effect of the oil tax on internal-combustion locomotives. This need not alarm us, since it is doubtful whether oil-electric traction would ultimately provide an electrical solution. Sir Philip Dawson, M.P., who presided, pointed out that, while immediate whole-scale railway electrification might not be practicable, there were many sections of the main lines which would show a return of from 7 to 15 per cent. on the outlay incurred in conversion. The experience of the Southern Railway, and also of the L.M.S. Railway on its most recent electrification scheme between Manchester and Altrincham, provides conclusive evidence that passengers, at any rate, do appreciate the advantages of the improved service made possible by electricity. If the railways continue to lose passenger traffic they have only themselves to blame for not having done very much more in this direction than they have hitherto.

The Drumm Battery

FROM an Irish source we learn that the experts appointed by the Minister of Industry and Commerce of the Irish Free State to report on the Drumm-battery train have done so in favourable terms. It is said that the train tested has now run some 30,000 miles, without battery trouble, on daily journeys up to 230 miles. Official information will be eagerly awaited on such points as the capital costs and maintenance charges of the battery, its weight, whether it is likely to stand the high charging rates over its economic life, and whether it holds its charge during its periods of rest.

Birmingham Goes Ahead

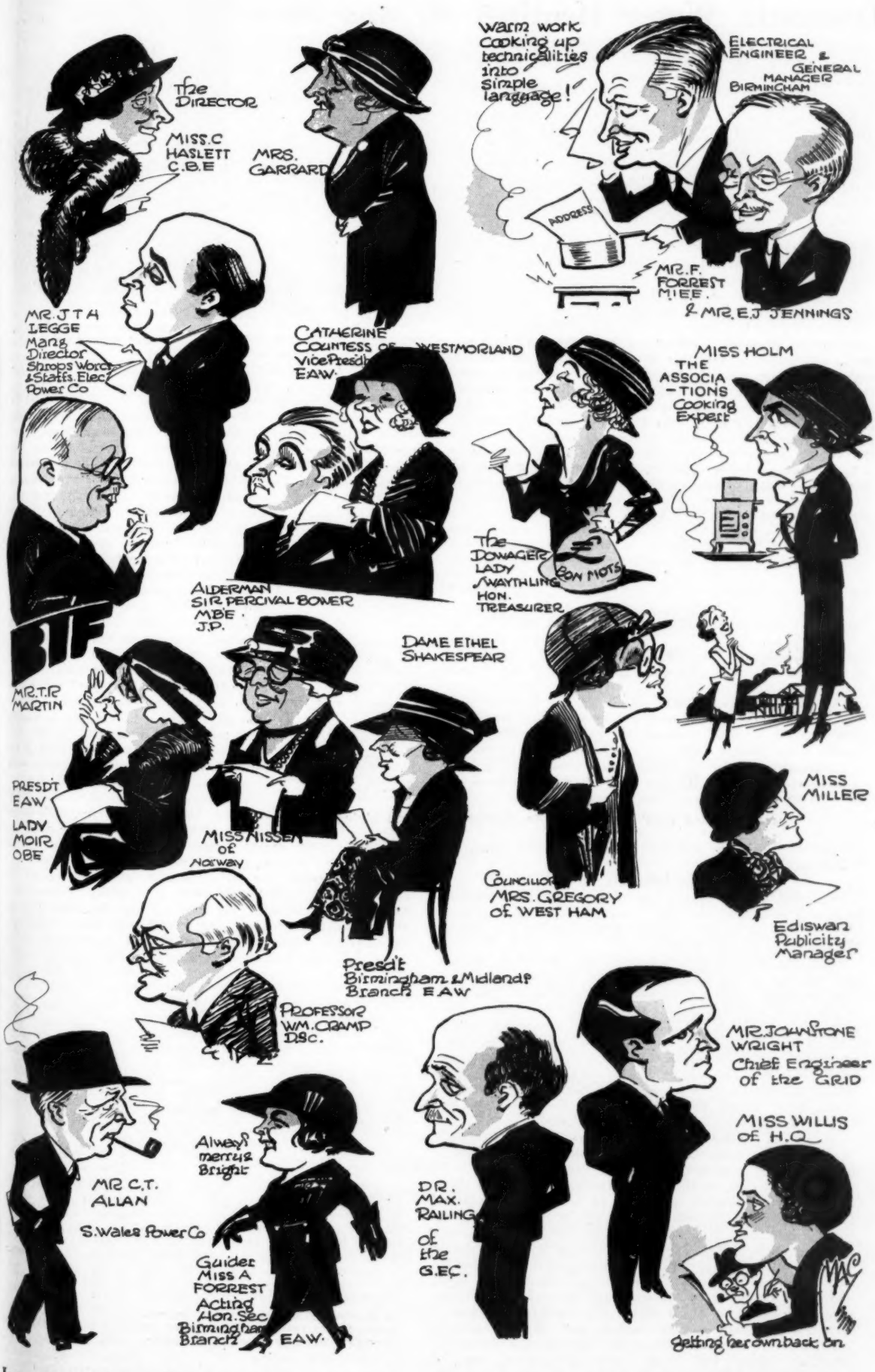
DURING the last financial year the Birmingham Electric Supply Department sold nearly 435 million kWh—46 million more than in 1931-32—and consequently claims to have surpassed the Manchester sales, which hitherto have been the largest of those of the municipal undertakings in this country. We are so used to hearing of advances being due to the improved domestic consumption that it is a very welcome change to find that Birmingham attributes its increased output to a number of large industrial contracts secured during the year. It is to be hoped that this indicates the turning of the adverse tide against which industry has been battling so long.

Electric and Oil Heating

THE introduction of an import tax on heavy fuel oil should provide new opportunities for the electrical engineer in the heating of large buildings, industrial furnaces and baking ovens. An additional penny per gallon on oil at 50s. per ton would increase its cost by over 40 per cent. At 3.75d. per gallon oil with a calorific value of 18,500 B.th.u. per lb, would cost about the same as electricity at ½d. per kWh, taking efficiencies of 12 per cent. and 85 per cent. respectively. But no one would use oil unless monetary savings on a fuel basis could be anticipated, and the tax should make electricity an even more valuable and efficient channel of distribution for home-produced coal.

The Undertaking is the Thing

SPEAKING at the E.A.W. Conference the Lord Mayor of Birmingham quite legitimately referred with pride to the Corporation's Hams Hall station; he could have referred with equal pride to its methods of distribution. We believe that civic dignitaries generally would show a greater appreciation of public values if they gave pride of place to the *undertaking* as such. The public is not really concerned with the source of electricity so much as with how the electricity is delivered to the consumers. The power station is only an ancillary factor and, interesting as it may be, should not be allowed the main attention.


The DIRECTOR
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Warm work cooking up technicalities into simple language!
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DR. MAX. RAILING of the G.E.C.
Getting her own back on

Impressions of Some Well-known People at the Birmingham Conference of the E.A.W. **(See page 666)**

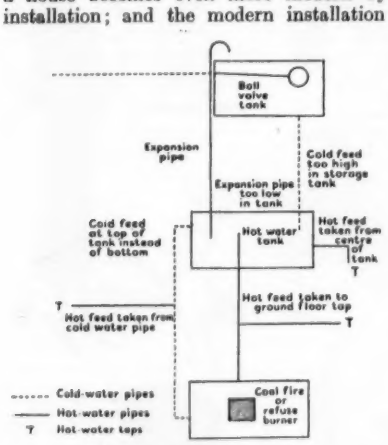
Domestic Water Heating. By Wm. Jervis

The installation of electric immersion heaters

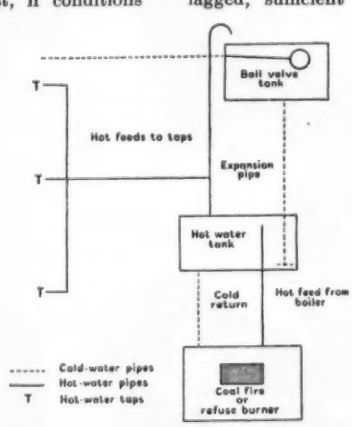
Mr. Jervis is sales engineer to the North Metropolitan Electric Power Supply Co.

ELECTRIC water heating does not call for the "high pressure salesman." It is an error to attempt to sell an installation in which there is any possibility of failure which would cause loss of faith in electricity for domestic purposes generally. One failure works almost incalculable harm, more particularly if the consumer happens to be a public man. Even if fairly satisfactory results are ultimately obtained, usually at considerable expense, the stigma of initial failure remains. The satisfied consumer does not often preach the gospel of recommendation to anything like the degree to which the "man with the grouse" will air his grievances. If in doubt, don't recommend an immersion heater installation!

The chief points to be put forward to a consumer considering such an installation are as follows: Electricity offers a constant supply of hot water, unequalled by any other method, involving no attention, work or worry; if the conditions are good, hot water is available at any hour of the day or night, either for ordinary domestic or for emergency uses; the house, and particularly the kitchen or living-room, remains cool during the summer; immersion heaters may be used either independently or in association with existing arrangements; cheap rates for water heating are usually offered by the electric supply authority, particularly for "off peak"; a house becomes even more modern by adopting such an installation; and the modern installation cost, if conditions are favourable, is low and hire purchase or hire terms are usually available.


Ball valve tank
Expansion pipe
Cold feed too high in storage tank
Expansion pipe too low in tank
Cold feed at top of tank instead of bottom
Hot water tank
Hot feed taken from centre of tank
T
Hot feed taken to ground floor tap
Hot feed taken from cold water pipe
Coal fire or refuse burner
Cold-water pipes
Hot-water pipes
Hot-water taps

Incorrect piping work



An example of correct piping work

Installation

Immersion heaters provide an inexpensive, highly efficient method of producing hot water, providing conditions are suitable and that the supply authority offers a rate for the purpose not exceeding ¾d. per kWh.

Practically every modern house possesses a hot-water storage tank situated in the bathroom, kitchen, living-room, or in a linen cupboard, all more or less easily accessible. The sizes of the tanks vary, but usually for a house with three or four bedrooms a 25 to 30 gal. tank is used. If the size of the tank is less the idea of conversion should be abandoned. The most suitable arrangement is to introduce into the storage tank 2 in. from the bottom a 2-kW immersion heater in a horizontal position, in series with and controlled by a suitable thermostatic switch fitted about 3 in. above the heater, also in a horizontal plane. The thermostat should be set to switch out the heater at 120 deg. to 160 deg. F., depending on whether the water is hard or soft, and on the amount of hot water used, and in at 10 deg. F. less.

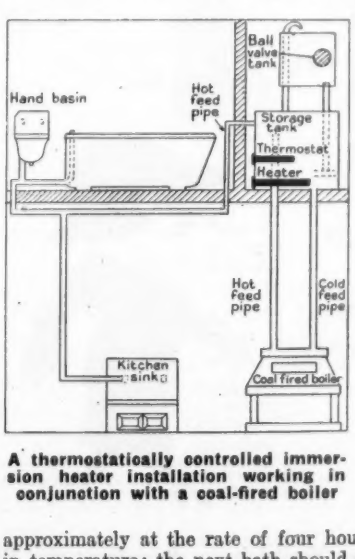
This installation, providing the existing piping is in order, should furnish constant hot water for a reasonable number of baths and for all domestic purposes for a family of four or five persons. Where a larger tank is installed, or the family exceeds this number, the loading of the heater should be increased. The heater is left permanently switched on at full load and is controlled solely by the thermostat. When the house is vacated the supply to the heater may be disconnected by switching off at the service termination, where a double-pole combined main switch and fuses should be installed. It is essential that the storage tank should be efficiently lagged with heat insulating material, such as granulated cork, asbestos wool, &c. This is not an expensive item, costing between 12s. 6d. and 20s. (according to the material used, which is quickly repaid by the electricity saved.

The supply authority might question the probable effect of a considerable number of these heaters on its mains at the peak. To remove this objection a time switch set to disconnect supply during "peak" hours may be fitted, but I think it is now generally agreed that the diversity factor would ensure that the number of heaters taking supply at these times would not materially affect the demand.

Where a consumer does not require a constant supply of hot water, the sizes of the immersion heaters may be suitably proportioned, *e.g.*, 3 kW loadings for 25 to 30-gal. tanks controlled by hand-operated three-heat switches placed in a convenient position. Allowance must be made for the time lag before hot water is available. The tank should preferably be lagged. To my mind there is no comparison between the two methods for convenience or efficiency. If a small area at the top of the tank is left unlagged, sufficient heat will be radiated for airing clothes without seriously impairing the efficiency of the heat insulation.

One of the many advantages of the immersion heater, particularly the thermostatically controlled type, is that it may be used in conjunction with the existing arrangements. In winter, with the use of the coal-fired boiler or refuse burner, very little electricity would be required to assist in the production of constant hot water, and in the event of the fire being accidentally let out, it would ensure a supply of water at a high temperature, particularly early in the day when a full supply is usually required. The immersion heater will also remove the insufferable heat of the kitchen or living-room, associated with coal fires, &c., during the summer.

The expenditure involved in an immersion heater installation, with wiring and lagging, would be between £8 and £10, excluding small piping alterations. The average consumption of an installation for a family of four or five persons for all domestic purposes should be from 60 to 100 kWh per week, if working independently of other heat sources. (For a 20-gal. self-contained tank the range would be from 80 to 100 kWh per week.) The data given below, based on actual tests and experiences, should be of assistance to those designing immersion heater installations for the average type of house.



A thermostatically controlled immersion heater installation working in conjunction with a coal-fired boiler

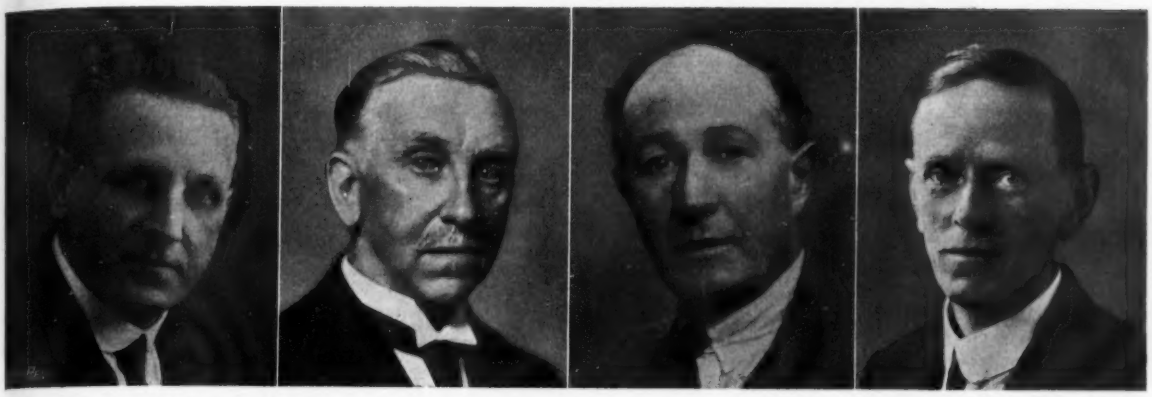
Temperatures, deg. F.: cold water, 40 to 60, room, 65 to 75; bath, 105; dish washing, 120; scalding, 150; boiling, 212; 1 kWh will boil 1 gal. of water in about 30 min.; 1 lb. of water at 60 deg. F. occupies 27.6 cu. in.

The number of successive baths obtainable with thermostatic control are:—

Size of Tank. Gal.	kW.	Baths.
25	2	2
30	2	2
40	3	4
60	4	6

With a 2-kW heater in a 25 to 30 gal. tank, the recuperation is approximately at the rate of four hours per 100 deg. F. rise in temperature; the next bath should not be drawn off for at least an hour. In winter the average standing loss sustained by a 25 to 30 gal. tank is 3.5 kW per day, if no hot water is drawn

Some Municipal Electrical Engineers



From left to right: Mr. E. Grime (*Elliott & Fry*), Grays; Mr. W. Frisby (*Elliott & Fry*), Colchester; Mr. R. H. Holmes, Shoeburyness; and Mr. A. C. Johnson, Southend-on-Sea.

Domestic Water Heating (*Continued from opposite page*)

off and with reasonably short and efficient pipe work. Wash basins using ¾ to 1 gal. at 175 deg. F. mixed with 1 gal. of cold water take ¼ kWh per wash. For washing up with water at from 120 deg. F. to 150 deg. F. ¼ kWh is required per gallon. The normal bath requires 10 to 12 gal. at 175 deg. F., mixed with 15 gal. of cold water (giving 25 to 27 gal. at 105 deg. F.) and uses 4 kWh.

Average weekly consumptions in kWh are: hand basin 10, domestic use, including washing up, &c., 20, six baths at 4 kWh each 24, standing losses 14, total 68 kWh.

The kWh required to raise given quantity of water to a given temperature in given time = gal. × temperature rise/300 × hours; the temperature rise per hour = kW × 300/gal.; the temperature rise = kW × 300 × hrs./gal. Gallons per hour = 300 × kW/temperature rise.

These figures are based on an efficiency of 88 per cent. For other efficiencies divide the constant 300 by 88 and multiply by the new efficiency figure.

Pitfalls for the Unwary

If a coal fire is used during the winter in the living room, where the boiler is usually situated, hot water is obtained largely as a matter of course. It is usually only when other methods of procuring hot water are considered that the defects in the piping arrangements come to light. The sketch on p. 660 shows defects which may be met with and checked up before a decision is made to recommend an immersion heater installation. The ideal arrangement also shown, should, if the hot feed pipes are short, provide material for a successful conversion to immersion heating.

If all other conditions are favourable an installation should be satisfactory if the length of all hot water feed pipes between the storage tank and the hot taps does not exceed 30 ft. As approximately 1 gal. of water is contained in a 30 ft. run of 1-in. steam barrel the heat loss when a hot tap is 60 ft. from the storage tank is heavy.

If an expansion pipe, from which all hot feeds to taps may be taken, runs outside the house or is unusually long, a "U" bend not less than 3 in. high should be fitted immediately above the point at which the hot feed to taps is taken. This will have the effect of forming a hot "trap" and so reduce losses. Particular attention should also be paid to the cold-water inlet pipe to the storage tank. When hot water is withdrawn there is a rush of cold water under pressure into the tank, which mixes with the hot water, lowering its temperature. To obviate this a tee piece or baffle plate should be fitted to the cold inlet pipe inside the tank.

It must be constantly borne in mind that the losses govern to a very large extent the running costs, and that an immersion heater only effectively heats water above its own level; the heater should therefore be fitted about 2 in. from the bottom of the tank. In many cases hot feed pipes to taps on the ground floor are taken from the hot pipe leading from the coal-fired boiler to the storage tank. To ensure maximum temperature at these taps with an immersion heater installation, these feeds should be disconnected and reconnected to the expansion pipe or hot feed pipe leading from the storage tank.

Where abnormal quantities of hot water may be used for washing up under running hot water, the fitting of a spring tap will very materially reduce consumption—another good selling point.

In emptying a storage tank not already provided with a stop cock on the inlet side and a draining cock, the ball valve in the supply tank should be tied up and the manhole cover carefully removed by first removing the bolts at the top of the cover and syphoning the water by a piece of hose into a suitable receptacle. When the manhole cover is replaced after the immersion heater has been fitted, careful watch should be kept for possible leaks around the cover, particularly during the first heating up.

The immersion heater should be effectively earthed. This may be easily and cheaply done by fitting a set-screw drilled and tapped into the collar of the heater, carrying a suitable cable socket into which the earth wire has been sweated. The earth wire should be connected to a reliable earthing connection assisting in preserving continuity.

The hot-water feed pipes to tanks may be connected to the expansion pipe if desired. When the manhole cover of the tank is removed the opportunity should be taken to ensure that the cold feed pipe from the supply tank reaches almost to the bottom of the storage tank. The hot feed pipe to the bath should be large enough to supply a sufficient volume of hot water quickly, in order to reduce losses by radiation from the water standing in the bath. The cold water, approximately 15 gal., should be introduced into the bath first, and a suitable length of rubber hose fitted to the hot tap and terminating at the bottom of the bath, thus allowing the hot water to make its natural rise through the cold, so raising the temperature as required.

By a small and inexpensive alteration to the piping, the cost of which may be included in the quotation, a satisfactory result may often be obtained, which at first might have appeared impossible.

Rapid Progress in Norway

ACCORDING to notes reproduced by *Elektrotechniache Zeitschrift* from a manuscript of H. Steen-Hansen, Oslo, the water power of Norway amounts to about 9,200,000 kW (annual mean), of which 1,700,000 kW or 18 per cent., is utilised. The corresponding possible amounts of energy generated, at 100 per cent. load factor, 8,760 hours per annum, are about 80,000 million kWh, and 14,900 million kWh respectively. Actually 9,200 million kWh was generated in 1930, or about 3,960 kWh per inhabitant. About 782,000 kW, or 46 per cent. of the total installed generator capacity provides a general supply, the rest being utilised by electrochemical, electro-metallurgical and timber industries.

The mean load factor of general electricity supply is about 0.6. In 1930 the general supply output was 3,500 million kWh of which about 1,700 million kWh, or approximately 50 per cent., was used for domestic purposes, averaging 840 kWh per inhabitant, and 3,600 kWh per family per annum. Contract tariffs with current limiters are generally in force at prices from about £5 to £12 15s. per kW-year (taking 19.60 kr. = £1), or say, £9 average. On this basis, the hours of use are high, say, 6,500 hours per annum, and the cost then averages about 0.33d. per kWh. For an average family consuming (per annum) 1,800 kWh for cooking, 5,000 kWh for hot water, 350 kWh for lighting, and 1,500 kWh for other purposes, or 8,650 kWh total, with 2 kW maximum demand, the cost is about 0.5d. per kWh. Owing to the cheapness of the supply, electric cooking is very popular, and the use of electricity for heating is extending. To encourage this development, a number of supply authorities have introduced multi-part tariffs in addition to contract tariffs.

Light-weight D.C. Motors. By J. W. Burleigh, A.M.I.E.E.

A design giving high output from a given amount of material

THE number of interpoles of a traction motor usually equals the number of main poles. To obtain minimum dimensions and weight the poles are often arranged in an octagonal frame, the main poles being disposed on the vertical and horizontal axes and the interpoles at an angle of 45 deg. from the centre line. A typical design for a railway motor of this type was shown in the I.E.E. *Journal* of March, 1931 (page 353), in which the ratio of the height of the frame to the diameter of the armature was from 1.55 to 1.65 to 1, compared with from 1.8 to 1 for a motor with a circular frame.

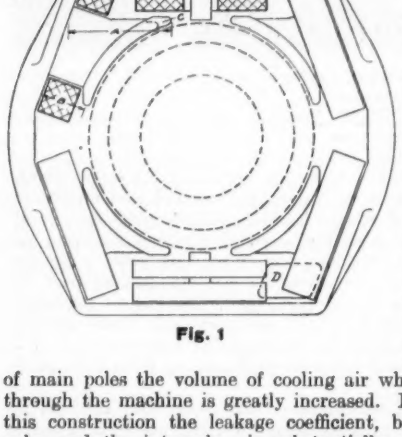


Fig. 1

The cooling air is usually drawn through these motors in an axial direction. Owing to the restricted dimensions of the magnet frame and to the necessarily compact arrangement of the main and interpole coils, difficulties arise in providing sufficient cross-sectional area for the air streams. By using one interpole for each pair of main poles the volume of cooling air which can be passed through the machine is greatly increased. Furthermore, with this construction the leakage coefficient, both for the main poles and the interpoles, is substantially reduced. The less material required for the interpoles, the better ventilation, and the reduced magnetic leakage considerably lessen the total weight of the motor. With a motor having four main poles and two interpoles the fullest advantages are obtained when the magnet frame is designed so that its external circumscribing figure is an irregular hexagon and the main poles disposed so that the ratio between the lengths A and B in fig. 1 is not less than two to one. The pole shoes are preferably skewed in relation to the armature slots as indicated at C.

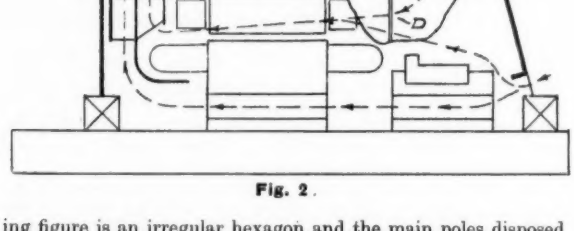


Fig. 2.

A Modified Magnet System

Fig. 3 is a fragmentary view of a modification of the magnet system shown in fig. 1. This design is especially suitable for motors for use where head room is very limited, as it enables the ratio of the height of the frame to the diameter of the armature to be reduced to 1.45 to 1 or even less. The field coils are wound in two portions superposed in the space not occupied by interpoles and having a side-by-side relationship on the opposite side of the pole. One reason for the frame being lower than that of the ordinary construction is that the top and bottom portions of the yoke carrying the interpoles are of smaller cross-sectional area and, therefore, not so thick as the portions of the yoke which do not carry interpoles. Another reason is that the designs shown admit of the interpole coils being wound with a greater depth and with less radial length than in the ordinary design.

The large space available for each interpole enables its cross-sectional area to be increased in the portion adjoining the yoke; this improves the saturation characteristic and increases the overload capacity. If the windings for this form of interpole are divided into two sections and axial and radial ducts are provided (fig. 1) the temperature rise, for equal weight of copper, is 20 per cent. lower than it is when wound with coils of the non-ventilated type. This percentage is derived from several heat tests taken from machines having half the usual number of interpoles and this method of ventilation.

The main or interpole coils, or both, must be tapered in motors having the full number of interpoles, but this is avoided in the construction shown in figs. 1 and 3. Another advantage, compared with the octagonal frame type, is that the main poles and the brushes are disposed at an angle of 45 deg. from the horizontal centre line.

Efficient Cooling

The external form of the field magnets permits of a large air intake in each corner of the frame, one of which, D, is shown in fig. 1. A large proportion of the cooling air is drawn through these intakes and through the ducts in the armature (fig. 2), leaving only a relatively small volume of air to pass over the commutator. This method of cooling has the advantage of lessening the likelihood of dust or grit coming into contact with the commutator—a point of importance in any fan-ventilated machine.

In motors having a small vertical dimension, such as in the kind under consideration, the fan diameter, relative to the armature diameter, is smaller than in an ordinary motor. It is, therefore, necessary to design the fan to draw a large volume of cooling air through the machine at a comparatively low water gauge. If the fan is placed at the commutator end (fig. 4) its intake area is increased and the blades can be made deeper, thereby enabling it to handle the required quantity of cooling air. It is an advantage to fit the fan at the commutator end in an ordinary industrial motor, because the amount of dust deposited on the commutator is reduced and carbon dust is prevented from being drawn into the windings.

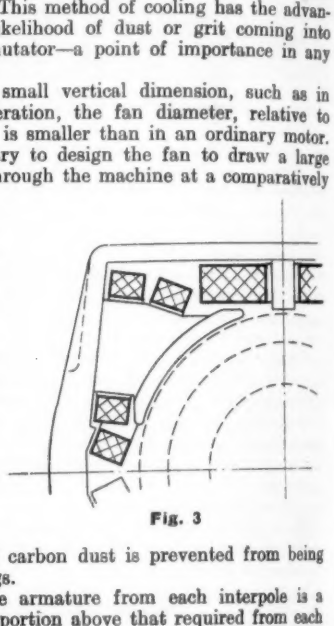


Fig. 3

The flux entering the armature from each interpole is a comparatively small proportion above that required from each interpole when the full number is employed. Owing to the required flux being less than one might expect and to the lower leakage coefficient, the cross-sectional area of each interpole need not be more than 10 per cent. greater than that of each interpole when using the full number.

The weight of materials in each interpole is approximately 20 per cent. more than the weight of each when the full number of interpoles is used. A further saving in the weight of the active materials results from the increased heat-dissipating properties of the machine due to the larger volume of cooling air. In addition there is a saving in weight because of the lower magnetic leakage of the main poles. The gross weight of a motor having a magnet system as described is from 12 to 16 per cent. less than that of a motor having the same number of interpoles as main poles.

I have had a lengthy experience with industrial motors having field magnets with half the usual number of interpoles, including a line of variable-speed motors of up to 130 b.h.p.

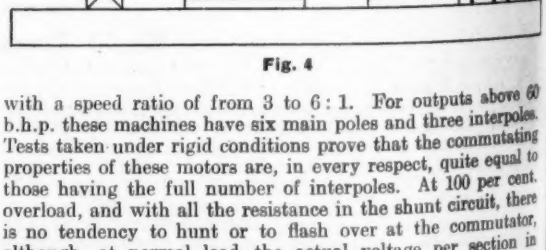


Fig. 4

with a speed ratio of from 3 to 6 : 1. For outputs above 60 b.h.p. these machines have six main poles and three interpoles. Tests taken under rigid conditions prove that the commutating properties of these motors are, in every respect, quite equal to those having the full number of interpoles. At 100 per cent. overload, and with all the resistance in the shunt circuit, there is no tendency to hunt or to flash over at the commutator, although, at normal load, the actual voltage per section in many of the machines lies between 40 and 50 V. Machines with magnet systems having half the usual number of interpoles have been constructed by well-known firms, but their characteristics differ from those of the design described.

The Oberhasli Hydro-electric Works

Difficulties in constructing a very high station

THE idea of utilising the water power available in the Oberhasli district of the Bernese Alps has engaged the attention of Swiss engineers for the last thirty years. A scheme for which Ing. A. Kaech was responsible received the approval of the Swiss Government in July, 1924, and to carry it through the Kraftwerke Oberhasli Gesellschaft was formed under the auspices of the municipalities of Basle and Berne and the Bernischen Kraftwerke Gesellschaft, the last-named undertaking the distribution of all the power generated.

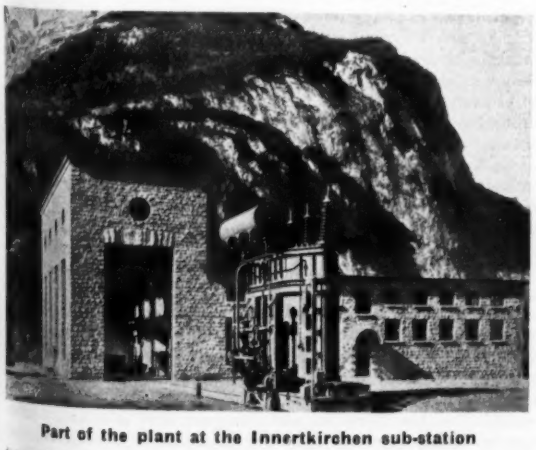
The work of building dams on the River Aare to form two large storage lakes (the Grimsel and the Gelmer) was started in 1925, and, due to the severe climatic conditions which only permitted operations to be carried on during a relatively short period each year, it has taken practically eight years to complete. The Grimsel dam, which is 373 ft. high, forms a lake with a storage capacity of over 24,200 million gallons of water. The dam is 210 ft. thick at the base, and on the land side is stepped every 6½ ft., the width at the top being 13 ft., and the sill length 846 ft. The lake formed by the dam will, owing to the freezing up of the water-supplying glaciers and streams, be practically empty each spring. By the middle of May it will commence to refill, and between mid-August and mid-September the water will reach its highest level.

From the Grimsel lake the water passes through a tunnel 8½ ft. in diameter and nearly 3¼ miles long, cut through the mountains to the Gelmer storage lake, which is 5,900 ft. above sea level. A dam, 1,313 ft. long and 114 ft. in height, gives it a storage capacity of 2,860 million gallons. In the tunnel has also been laid a 16,000-V electric power transmission line and two l.p. cables, one for telephone communication and one for transmitting control and measurement instructions.

When it leaves the Gelmer storage lake the water passes to the power station at Handeck through an inclined, covered gallery 560 ft. in length and 8 ft. 9 in. in diameter, and thence through a round, armoured pressure pipe 3,660 ft. long and varying in diameter from 6 ft. 9 in. to 7 ft. 6 in., laid in a tunnel cut through the solid granite. For about three-fourths of its length the pipe has a slope of about 72 per cent. and the remainder 8 per cent., while the thickness of the pipe increases from 10 to 14 mm. The space between the tunnel and the pipe is filled with cement, and the various sections of the pipe were electrically welded together on site.

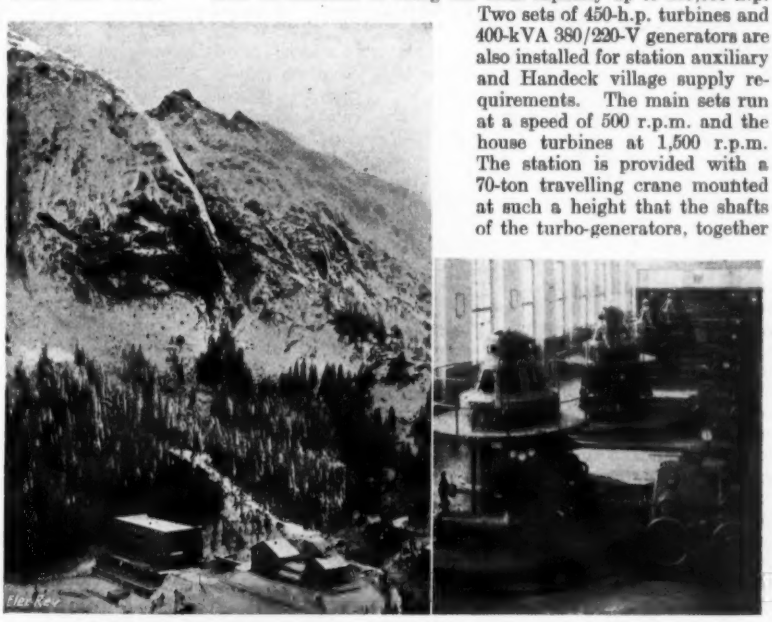
The Generating Plant

The Handeck power station, on the right bank of the River Aare, is five-eighths of a mile from the Gelmer lake, but between the outlet of the latter and the turbine shafts there is a difference in altitude of about 1,780 ft. It is situated in such a desolate region, about 6,250 ft. above sea level, that to reach it a special tunnel, approximately 7 ft. 4 in. in diameter and about three miles in length, has had to be constructed for the greater part of the distance between the plant and the village of Guttanen. The station covers an area of 75 ft. by 185 ft.



Part of the plant at the Innertkirchen sub-station

The plant comprises four 30,000-h.p. Escher-Wyss vertical shaft turbines directly coupled to Oerlikon 28,000 kVA generators. The only parts of the sets visible in the machine room are the super-imposed exciters, the generators themselves being in pits between the two floors. A fifth turbo-generator set can later be installed to bring the total capacity up to 150,000 h.p. Two sets of 450-h.p. turbines and 400-kVA 380/220-V generators are also installed for station auxiliary and Handeck village supply requirements. The main sets run at a speed of 500 r.p.m. and the house turbines at 1,500 r.p.m. The station is provided with a 70-ton travelling crane mounted at such a height that the shafts of the turbo-generators, together with the rotors, can be entirely withdrawn from overhead.



Left: The Handeck power station. Right: A view of the machine hall

A switchboard enables machine-room control to be effected, in addition to remote control from the main supervising office at Innertkirchen, with a minimum staff: one man at the switchboard and one looking after the generators.

Transformation and Distribution

Four Brown-Boveri 28,000-kVA transformers step up the power generated at 11,000 V to 50,000 V for transmission to Innertkirchen by single-phase 50-kV cables laid in the approach tunnel already mentioned as far as Guttanen. The cables are lead-sheathed with a bronze sectional area of 171.6 mm., there being three for each of the four generating sets. The cables are laid on a damp bed of sand, and for their inspection an electric (accumulator) trolley running in the tunnel on a narrow rail track is provided, this being also used for the conveyance of the staff to and from Handeck and Guttanen, the children of the staff being also carried to and from school in this way in order to avoid the risk of accidents due to avalanches and snow slides in the district. The motor of the trolley is so designed that on the downhill journey it acts as a generator and charges the battery.

From Guttanen the power is transmitted by four 50,000-V cables a further distance of about 3¼ miles to an outdoor sub-station at Innertkirchen, where it is stepped up to 150,000 V by four Brown-Boveri 26,000-kVA transformers, one for each incoming cable. Owing to the extremely high winds experienced between Guttanen and Innertkirchen, a safety factor of two has been allowed for the lines and supporting masts.

A feature of the transforming station is the central control and switching rooms from which not only are the four generating sets at the Handeck station controlled, but also the two 150,000-V transmission lines to the distribution station of the Berne Power Co. at Bickigen and a 150,000-V line to the Lungern power station of the Central Swiss Power Co., a special system of distance impedance relays having been installed. The only oil circuit breaker for each generator is on the 150,000-V side at Innertkirchen, whence the generating set voltage, output, and speed are remote controlled, or orders given to the Handeck staff by telephone, all the control movements and instructions being shown on dials at both stations.

A Prospective Extension

With a turbine capacity of 120,000 h.p. the plant will be able to supply the Basle and Berne districts with 223 million kWh per annum, of which more than half will be available during the winter period. As the demand for power supply grows

it is proposed to erect an additional station at Innertkirchen with plant totalling 160,000 h.p. and capable of an output of 311 million kWh per year. As this station will use practically the same water as the Handeck plant, and as no further costly dam construction will be necessary, production costs will be extremely low.

The installation is estimated to have cost 82½ million Swiss francs, equal (at 25 francs to the £) to £3,300,000. To meet requirements during the constructional operations, in addition to large quantities of power supplied from the Lungern lake hydro-electric power station of the Central Switzerland Kraftwerke Co., temporary hydro-electric plant of a capacity of 800 h.p. was constructed near Lake Gelmer. A temporary 16,000-V transmission line with numerous branches had also to be erected between Grimsel Lake and Innertkirchen. Altogether, it is estimated that 180,000 tons of material of all kinds have had to be transported during the eight years, the bulk of it to a height of over 6,200 ft.

Materials for Steam Turbines. By S. D. Scorer, M.I.Mar.E.

IN arriving at the dimensions of parts intended for steam turbines, the object of the designer is to use the smallest weight of material that is consistent with the demands of safety. The problem is complicated, in some instances, by the stresses arising from the combined effects of steam pressure and temperature and high rotational speed. An inaccurate appreciation of the safe working stress of a metal may lead to a considerable increase in the weight, and, consequently, cost, of a steam turbine, whilst an error in the opposite direction may result in a serious accident.

The materials commonly used in the construction of steam turbine parts are cast iron and various forms of steel. The essential characteristics of cast iron originate in the proportion of its carbon content which exists in a combined and in a free (graphitic) form; micro-photographs show that the internal structure of ordinary cast iron consists of an iron base intermixed with graphite flakes, the whole presenting a coarse-grained appearance. The intermingling of the free carbon with the iron has a weakening effect on the metal in that it breaks up the uniformity of structure. Coarse-grained cast irons should not be used for any but low mechanical and thermal stresses. For moderate temperatures the cast iron used must be of a pearlitic nature in which the graphite content is well interspersed throughout the body of the metal; this ensures a much closer grain, together with an increased strength and power of resistance. It is essential that a cast iron intended for a h.p. casing, or similar casting subjected to a moderately high steam temperature, should be of a pearlitic close-grained structure.

Mr. Sydney D. Scorer has had a good deal of experience with marine and land-type turbines

Effects of Heat on Cast Iron

At temperatures such as are experienced in this section of a turbine, cast iron is liable to undergo internal change. A portion of the combined carbon is converted into the graphitic form, and becomes attached to the graphite crystals already in the body of the metal. The process is accompanied by an increase in volume which results in the weakening of the internal structure, together with external distortion strains, and the disintegrating action is further intensified by internal oxidation taking place along the lines of the graphite layers. The oxygen contained in the steam acting on the metal gradually combines with the free carbon, and internal metallic cracks are initiated which lead, finally, to the complete decomposition of the cast iron. In the case of castings made from iron with a fairly high proportion of silicon, these troubles are accentuated, as the silicon promotes the development of the graphite crystals.

The troubles met with in the use of cast iron for temperatures and pressures above about 500 deg. F. and 280 lb. per sq. in. have led to the adoption of cast steel for the h.p sections of steam turbines. In this material the carbon content is in the combined form, so that the risks of internal growth and disintegration are eliminated even at fairly high steam temperatures. Careful supervision is necessary during manufacture, as the presence of even small quantities of phosphorus or sulphur affects the internal structure of the metal.

The heat treatment of cast-steel parts is important. The usual practice is to anneal the casting to a temperature of from 1,200 to 1,600 deg. F. before rough machining. After the first machining operation the casting is further annealed to about 1,000 deg. F., so that any remaining internal or machining strains are eliminated. The length of time and temperature of annealing must be varied according to the weight of the casting. Too high a temperature usually causes a reversion to a coarse grained structure, and too short a cooling time may set up serious internal stresses. The stages in the manufacture of a steel casting should be controlled by laboratory tests.

Until recently the disadvantages of cast steel and the precautions necessary in its treatment have led one or two manufacturers of appliances for high-temperature steam to revert to cast iron, as it was considered that the risk of imperfect steel castings was too great. When cooling out a steel casting contracts considerably more than one of iron, so that there is always the possibility of internal stresses and blow-holes in the material. This danger has now been practically eliminated by improved foundry methods.

Mild steel is largely used in the manufacture of steam pipes, operating gear, rotors, &c., for steam turbines, and has given definite proof of its suitability. For steam pipes the ordinary low carbon steel (0.08/0.15 per cent.) has given satisfaction, although several alloy steels have been applied within recent years, for high temperatures. Turbine shafts and discs may be forged from Siemens-Martin steel when intended for moderate speeds, and the forging process improves the tenacity of the metal. It is important that the forging should be worked right through, otherwise the ductility will be impaired, and the quality poor. This is essential for parts rotating at high speed, as the most highly stressed material is at the centre of the forging and is likely to be defective if insufficiently forged.

Most reputable manufacturers bore a hole through the centre of parts such as turbine rotors, &c., and examine the interior with a form of periscope. In the case of turbine discs, much valuable information relating to the adequacy of the forging treatment and properties of the material may be obtained from a microscopic examination of a test piece taken from the bore, the structure of a poorly forged specimen being markedly more open than that of a part which has undergone correct treatment.

Rotor Forgings and Blading

A thermal treatment similar to that adopted in connection with steel castings is applied to rotor and other forgings, and when the stress is likely to be above the ordinary the treatment is considerably extended. Tempering by heating and quenching in oil is resorted to, and further heating is required in order to remove tempering stresses, and to obtain a material with the requisite properties. The various processes add considerably to the cost of the turbine part, and the more refined stages are usually carried out only on very highly stressed material.

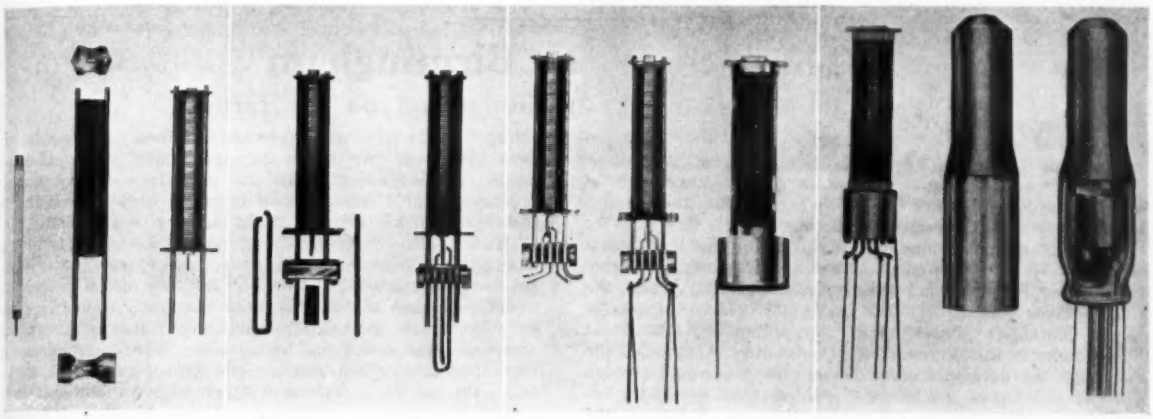
Materials for blades range from brass to nickel and stainless steels, and the final choice depends on the practice and experience of the maker. The requirements of this section of the machine are a combination of strength and toughness at the designed working temperature, as well as a marked resistance to erosion and corrosion. Attempts have been made to form protective coatings on ordinary blade materials in order to obtain the required properties without great expense, but these have not met with any striking success. Stainless and nickel-chrome steels have been found very suitable for blading material, and all have strength and resistance to high temperatures, &c. The disadvantage of a slightly higher cost is counter-balanced by the increased life of the alloys.

In order to improve the qualities of existing materials, the addition of other elements to cast iron and steel has been experimented with, and the suitability of the resultant alloys for steam turbine work is now fully demonstrated. Cast iron has been improved by adding nickel and a small proportion of chromium, so that the graphite content becomes finely dispersed throughout the metal. The latter then assumes a close hard-grained structure that is strongly resistant to the action of high temperature. The admixture of nickel or nickel-chromium in steel forgings for rotors, discs, &c., has also proved to be beneficial, and the extra strength of the alloy is of assistance in the design of discs for heavy stresses. This class of material will play an important part in the future development of steam turbines for very high temperatures.

"Catkin" Radio Valves

A NEW range of radio receiver valves for a.c. mains operation, of entirely novel design and almost all-metal construction, are being placed on the market by the General Electric Co., Ltd., and the Marconiphone Co., Ltd.

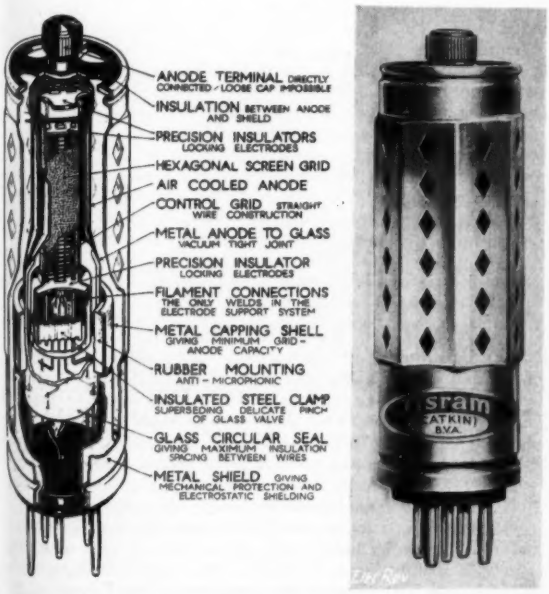
This new type of valve is of considerable technical interest. It is smaller in size than the conventional glass bulb type, much stronger, has more uniform characteristics, and is freer from microphonic effects. In place of the customary glass envelope, a copper container is used which is also the anode.



These illustrations show the methods of construction and assembly employed in the manufacture of the new "Catkin" valves

Large water-cooled transmitting valves made in this form are designated "C.A.T." (cooled-anode transmitters), an abbreviation which reveals the derivation of the name "Catkin" applied to the new air-cooled variety now manufactured for reception purposes.

The grid and cathode (filament) follow the design of the


ANODE TERMINAL DIRECTLY CONNECTED / LOOSE CAP IMPOSSIBLE
INSULATION BETWEEN ANODE AND SHIELD
PRECISION INSULATORS LOCKING ELECTRODES
HEXAGONAL SCREEN GRID
AIR COOLED ANODE
CONTROL GRID STRAIGHT WIRE CONSTRUCTION
METAL ANODE TO GLASS VACUUM TIGHT JOINT
PRECISION INSULATOR LOCKING ELECTRODES
FILAMENT CONNECTIONS THE ONLY WELDS IN THE ELECTRODE SUPPORT SYSTEM
METAL CAPPING SHELL GIVING MINIMUM GRID-ANODE CAPACITY
RUBBER MOUNTING ANTI-MICROPHONIC
INSULATED STEEL CLAMP SUPERSEDING DELICATE PINCH OF GLASS VALVE
GLASS CIRCULAR SEAL GIVING MAXIMUM INSULATION SPACING BETWEEN WIRES
METAL SHIELD GIVING MECHANICAL PROTECTION AND ELECTROSTATIC SHIELDING

The metallised screen-grid "Catkin" valve

latest glass valves, but the method of assembling these electrodes has been modified materially. Greater rigidity results from the elimination of most of the bends and welds in the wire supports. Mica spacing pieces anchor the electrodes together and they take up their positions by contact within the inner walls of the metal envelope. This new method of supporting the electrode assembly allows of considerable accuracy in the spacing of the elements, the all-important factor upon which uniformity of characteristic depends. The electrodes are rigidly held and the spacing between them cannot alter; thus uniformity is the primary merit of the "Catkin" design, and it is stated that in quantity production an entirely new standard has been set as to the limits of variation between valves of any given type.

Absence of Electrostatic Charges

The touching of a glass valve when operating in a set may start mains hum, cause regeneration, or in other ways upset the working. This effect arises from the electric charge acquired by the glass and is customarily remedied by metallising. In screen-grid valves the grid-to-anode capacity is reduced by the removal of the charged glass container. The "Catkin" valve does not suffer in this way and its screening performance corresponds with the metallised glass valve.

The metal anode, which forms the exterior of the valve proper, is totally screened by a metal tube extending the full length of the valve and embracing the valve cap. The casing is ventilated to ensure easy dissipation of heat and is connected internally to the valve cathode terminal. Complete screening of the anode is superfluous in the case of output valves, and full advantage can be taken of the very effective cooling afforded by the exposed anode. As a result of this the rating of an output valve can be increased over its glass-contained counterpart.

The orthodox valve usually has a flattened glass portion into which the outgoing leads and supporting wires are embedded. The capacity set up across the glass dielectric at this point gives rise to loss, which is equivalent to a high-resistance shunt across the associated tuned circuit. With the present tendency to develop highly efficient tuned circuits using, for instance, the new iron core tuning coils, the loss arising in this glass pinch may mar the efficiency achieved by the use of special tuning equipment. In designing the "Catkin" valve, therefore, a departure has been made from the method of clamping the supporting wires; glass is no longer used, its place being taken by mica, and a rigid form of clamp has been devised, consisting of a steel stamping, which firmly holds in position the insulating pieces of mica. Glass is used as an insulator for bringing the wires out at the base of the valve, but in this case the leads are spread out around the circumference so as to afford ample spacing between them.

Where formerly the valve has been firmly embedded in the cap carrying the pin connectors, a flexible mounting is now adopted. The valve is held in a rubber ring and the outgoing leads pass down into a thin "Bakelite" cap carrying the valve pins. The springy rubber helps to prevent microphonic howl being set up by sound vibration transmitted

Non-metallised "Catkin" valves: MH4, VMS and MS4B, and MPT4

through the holder, while the effect of vibrating air acting on the valve envelope is minimised by virtue of its reduced physical dimensions.

Generous air cooling of the anode, which is exposed, keeps down the temperature of all parts and so reduces the change

of internal gas evolution, thus maintaining good vacuum and reducing the prolonged de-gassing which glass bulbs require.

Compact assembly of components and reduced spacing are simplified by the small size of this new valve. It is stated that the valve can be dropped six feet on to a concrete floor with but small risk of damage, either by fracturing any of its parts or upsetting the critical electrode spacing. This property is of importance to set manufacturers, inasmuch as the valves used in the final test of a receiver may be retained in position.

Initially, four types of a.c. mains "Catkin" valves are available. The characteristics follow those at present possessed by the corresponding glass valves. They incorporate the latest type of filament-cathode design, permitting of a ten per cent. fluctuation of heater potential. The MS4B, VMS4, MH4, and MPT4 represent well-established types and permit of the design of sets using "Catkin" valves throughout. When output valves are supplied without the metal shield the anode is fully protected by heat-resisting and insulated enamel, completely avoiding danger of direct contact with the metal anode. The screen-grid and detector valves are available also in this form, in which an enamel protective covering replaces the metal shield.

The E.A.W. at Birmingham

Talks on electricity in the home and on the farm

THERE were nearly 300 delegates from the thirty-two branches of the Electrical Association for Women at last week's annual conference of the Association at Birmingham. A report of the papers presented at the opening session on May 4th appeared in our last issue.

At the luncheon on May 4th at the Grand Hotel the toast of "The City of Birmingham" was submitted by Catherine Countess of Westmorland (vice-president, E.A.W.) and the Lord Mayor (Coun. H. E. Goodby) replied. Professor E. W. Marchant, Pres. I.E.E., in submitting the toast "Electricity in the Service of the Community," expressed the view that the development of electric traction would provide a better solution of the housing problem than would the rebuilding of large flats in the central congested areas, as the population could be housed under better conditions in the suburbs. Response was made by the Dowager Lady Swaythling (hon. treasurer, E.A.W.).

During the afternoon the delegates visited the 90,000-kW Hams Hall power station of Birmingham Corporation, and Mr. Frank Forrest (city electrical engineer) gave an address on "Modern Methods of Producing Electricity," which was remarkable for the lucidity with which he explained the heat cycle in non-technical terms. He mentioned that 650 tons of water per ton of coal burnt was recirculated for condensing from the cooling towers, and 1,100 tons was burnt per week at Hams Hall. In the evening the chairman (Alderman Sir Percival Bower) and the members of the Birmingham Electric Supply Committee gave a reception at the Grand Hotel, which was very largely attended.

The Annual Meeting

At the annual meeting on Friday a statement of the work of the Association was made by Miss Caroline Haslett, C.B.E. (director), who said that the new headquarters would provide a medium for training women to interpret the service of electricity in the home, whether for mistress or maid. The Association had co-operated with good results with the Women's Institute movement. A diploma for women teachers of electrical housecraft had been established and 171 diplomas had been awarded to demonstrators and lecturers. An examination was being prepared for those who wished to take it. All the officers were re-elected, and it was announced that the Association had applied for incorporation.

The president's membership cup was awarded to Mrs. Marjorie Hutchinson, Farnworth, who had introduced forty-two new members during the year. The invitation of the Manchester and Salford branch for the next annual conference to be held in Manchester was accepted. A discussion on branch organisation followed. In the afternoon a visit was paid to the Witton works of the General Electric Co., Ltd. Mr. M. J. Railing (joint managing director, G.E.C.) and Dr. A. H. Railing (director in charge of the Witton group of factories) welcomed the members and guests, who numbered 400.

Mr. M. J. Railing, in a speech at the luncheon given by the G.E.C., proposing the toast of "The Electrical Association for Women," claimed that the manufacturer had done his duty in the domestic field; during the last ten years the cost of fires had decreased by 50 per cent. and that of cookers by 30 per cent. Catherine Countess of Westmorland, acknowledged the toast, and Dame Ethel Shakespear thanked the G.E.C. and its staff.

Dr. Railing outlined some of the things which the members would see during the tour of the works, which employ 8,000 people. On returning to the Magnet Club after the tour, the members heard talks by Mr. T. G. Leith (of the company's Electrical Appliances Department) on "The Modern Tendency in Design of Domestic Appliances," and by Mr. F. E. Rowland (manager, Agricultural Appliances Department) on "Electricity in Agriculture."

The Design of Domestic Appliances

Mr. Leith said that the financial disinterestedness of the E.A.W., and its intimate contact with homes throughout the country, made its work, supported by Press propaganda, the most efficacious way of introducing domestic electrical appliances. He believed that the use of a large variety of such appliances would improve load factor to such an extent that the maximum kW demand might one day be eliminated.

The four salient factors in manufacture were: (1) fulfilment of function; (2) mechanical and electrical soundness; (3) competitive price; and (4) approval by the lady of the house. He understood that the functions of the Association were not only to increase the use of electricity but also to ensure that apparatus was sound and economical. The trend of design was towards simplicity, streamline principles, labour saving (*e.g.*, the use of chromium plating), and the elimination of embellishments which involved corners and other dirt traps. Outward attractiveness must not be obtained by the sacrifice of sound mechanical or electrical qualities.

Developments in the design of cookers included switches on oven level (giving full width to the warming cupboard), circular hotplates with higher efficiencies and loadings, and a "de luxe" finish as standard. Limitation of the number of types and sizes had become an urgent necessity with a view to an extension of mass production. Such a limitation would, next to the activities of the E.A.W., do more than anything else to introduce electricity into the home.

In the United States, and generally on the Continent, cooker ovens had one set of standard dimensions—the only variation being in plate equipment. All homes should have an oven large enough to accommodate the Christmas turkey. Enclosed hotplates now gave very satisfactory performances, and two pints of water could be boiled in 8¼ minutes. Enclosed plates were probably responsible for meeting 80 per cent. of the country's requirements to-day, and had a long life due to the low temperature of the elements; only one replacement would generally be required during the economic life of a cooker.

Thermostatic oven control was not so necessary as with a gas cooker. Coupled with time control it was an attraction on an electric cooker, but under the prevalent hire systems the additional expense would not be justified.

Rural Electricity

Mr. Rowland drew attention to the size of the agricultural industry, which gave work to more people than the whole of the textile industries; there were more men employed in the dairy section alone than were engaged in the motor industry. For lack of electricity the domestic work of many farmhouses to-day was as hard as it was a century ago. As women often helped in farmwork also, the lightening of household duties had considerable economic advantage.

Fractional h.p. motors could be used for many operations previously done by hand, such as pumping, cream separating, and butter churning. A small electric pump with automatic control provided, without the drudgery of hand pumping, the adequate water supply that was essential on farms where stock was kept; the effect on milk yields was appreciable. Electricity was of especial value in poultry farming. Through the lighting of laying houses, winter egg production could be increased by lengthening the birds' working day and enabling them to take more nourishment. Electricity was also used for warming drinking water, ultra-violet irradiation, heating incubators and brooders, egg testing and plucking. Incubators were available with capacity of up to 70,000 eggs, which hatched out 23,000 chicks per week.

The use of soil-heating cables in garden frames and greenhouses permitted commercial growers under suitable conditions to benefit by import tariffs. The soil temperature could be automatically controlled and varied according to the plant or the period of its growth. The method could be used not only for accelerating growth, but also for rooting cuttings and seedlings to which bottom heating was beneficial, and for simply and cheaply eliminating the risk of damage by sudden frost. There was a comprehensive range of apparatus of all kinds for meeting the needs of farmers and other country-dwellers.

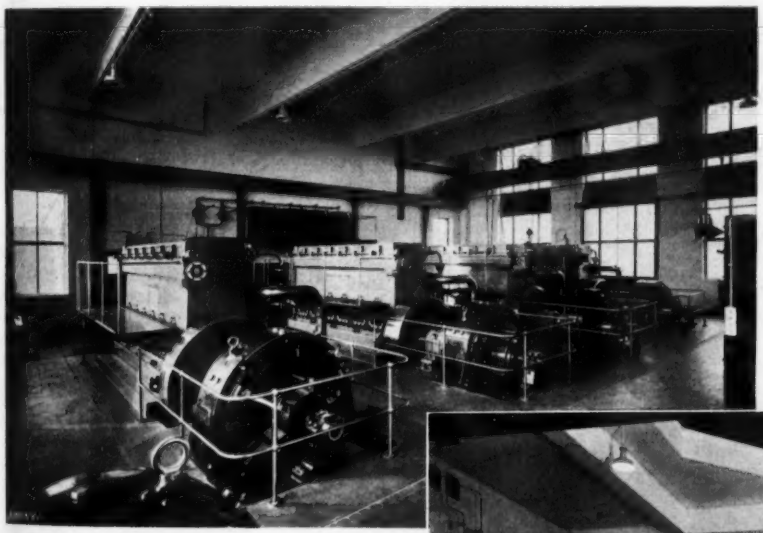
The West Regional Station

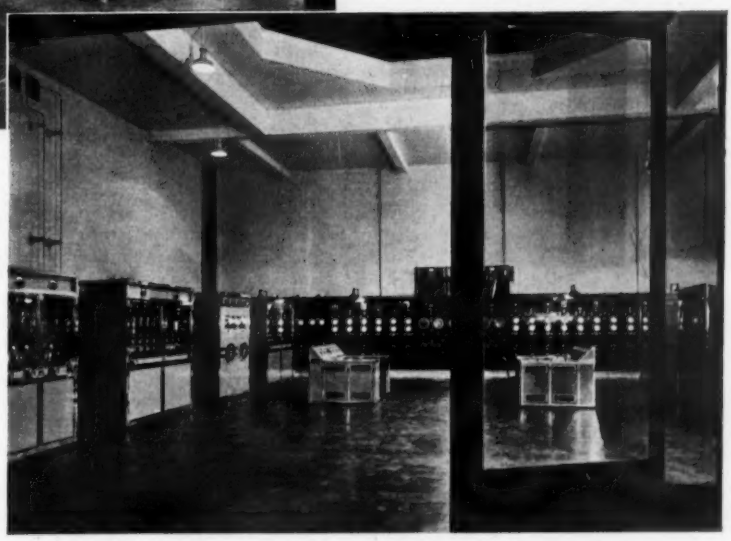
AT last the British Broadcasting Corporation's original plan of dual programme regional broadcasting has been completed. The fourth and last medium-wave high-power twin transmitter contemplated under that scheme has been built at Washford Cross, two miles from Watchet, and six from Minehead, in Somerset. It will serve the West of England and South Wales; the Cardiff and Swansea stations are to be closed down, but relays from Plymouth will continue as heretofore.

This does not mean that station building will now cease, for a new site is being looked for in Northern Ireland on which to build a bigger station to replace the Belfast transmitter. The long-wave (5XX) station at Daventry is also to be replaced by a new one at Droitwich. It will have about four times the existing rating and some of its power plant will be a complete departure from the B.B.C.'s present standard.

The new Washford Cross plant is very similar in design and equipment to that of the other regional stations. The power house contains four Diesel oil engines, each of 420 b.h.p. at 350 r.p.m. directly coupled to d.c. generators of 245-kW capacity (230 V). The average output is thus 735 kW, one of the four sets being normally spare. Two booster motor-generators are provided for charging the battery, which is capable of carrying the load of one engine set for one hour. It has 115 cells (230 V), is of 2,000-Ah capacity, and is used for lighting, cooking, &c., when the main plant is not running.

This plant provides the whole of the power required by the station, both for the transmitters and auxiliary services. The exhaust gases from the Diesel engines are passed through a waste-heat boiler to provide heating for the building, while an auxiliary oil-fired boiler is installed to maintain heating when the engines are not in use. Two oil tanks behind the power house provide storage for one hundred and fifty tons of fuel oil, which is sufficient for three months' supply. About five thousand gallons of water per day are used for the engine and valve cooling plants and other purposes. This is taken from the mains of the Williton Rural District Council.





Left: The power house. Right: The transmitter hall

Motor generators convert the 230-V d.c. to the various voltages required by the transmitting valves. Three filament generators each have an output of 1,300 A at 20 V, three anode generators each have an output of 19 A at 12,000 V, and three sets of grid bias machines have outputs at 200 V, 500 V, and 2,000 V. In addition, there are small high-voltage machines which supply the low-power oscillator and modulator stages of the transmitters the supplies being kept separate from the main high-voltage supply. Of the three sets of each type, two are used to provide power for the two transmitters and the third is a stand-by set.

The Transmitters

In the transmitter hall itself the two transmitters, national and regional, are arranged along either side, while the transmitter power switchboard occupies one end. In front of each transmitter there is a control desk on which are mounted a number of meters and the field current controls for the motor generators.

Each transmitter is contained in five cubicles constructed of steel and aluminium with glass panelled doors in front; access to the cubicles cannot be obtained without first switching off all dangerous voltages, as the cubicle door fastenings are interlocked with the power switches. The total number of valves in use in each transmitter is twenty. In the event of valve failure, spare valves, which are installed in the cubicles adjacent to the valves in circuit, can be quickly brought into use by the operation of a switch. The valves in the high-power stages are water-cooled, the water in each transmitter cooling system being circulated at a rate of approximately sixty gallons per minute.

In two control rooms, one for each programme, the telephone lines which bring the programmes to the station from Cardiff, London, and elsewhere are terminated, and here the programmes are controlled and checked before being passed to the transmitters. In addition, there are a studio for testing purposes, listening rooms, staff rooms, offices, a room containing tuning fork drive equipment, and a test room containing apparatus for checking and measuring the performance of the transmitters. The two aerials are of the umbrella type; each consists of three radiating conductors suspended from a single lattice-steel mast, five hundred feet in height. In order to avoid mast-shadow effect which would otherwise occur, each mast is insulated from earth by being mounted on porcelain insulators. Aircraft warning lights are fitted to the top of each mast.

At present only the West Regional transmitter (309.9 metres, 968 kilocycles) is working. The second transmitter, which will radiate the national programme on a wavelength of 261.6 metres (1,148 kilocycles) will not be introduced until the West Regional transmitter has taken over the full programme from the Cardiff and Swansea transmitters. Subject to preliminary tests being satisfactory, this second transmitter

will work on the same wavelength as the London National programme transmitter, and it is for accurate synchronisation that the tuning fork drive apparatus is being installed.

LIST OF PRINCIPAL CONTRACTORS

Diesel engines and auxiliary plant: Crossley Bros., Ltd.; engine driven generators and booster sets: General Electric Co., Ltd.; storage batteries: D. P. Battery Co., Ltd.; power house switchboard: Erskine, Heap & Co., Ltd.; main h.t. motor-generator sets, battery-charging motor-generator sets and switchgear: English Electric Co., Ltd.; auxiliary motor-generator sets: Haslam & Newton, Ltd.; oil-immersed choke coils: Johnson & Phillips, Ltd.; air-cooled choke coils: Ferranti, Ltd.; transmitters and aerials: Marconi's Wireless Telegraph Co., Ltd.; h.t. smoothing condensers: British Insulated Cables, Ltd.; condensers in transmitters: Telegraph Condenser Co., Ltd.; wiring contractors: Rouch & Penny, Ltd.; intercommunication telephones: Reliance Telephone Co., Ltd.; heating and valve cooling: Rosser & Russell, Ltd.; clocks: Synchronome Co., Ltd.; masts: Radio Communication Co., Ltd.

Heavy-current Testing

THE switchgear short-circuit testing-plant which has been in service at Hebburn-on-Tyne for three years was described in the ELECTRICAL REVIEW of May 30th, 1930. It was originally equipped to test circuit-breakers rated up to 1,500,000 kVA three-phase at 3.3 kV and over. It was decided during 1932 to provide a low-voltage transformer (for which space had been left in the lay-out of the plant), first because of the increasing demand for short-circuit tests of low-voltage circuit-breakers, fuses, and contactors, and, secondly, because the experience gained in testing high-breaking-capacity 6- and 11-kV circuit-breakers, showed that considerable economy and advantage would be obtained by proving at a low voltage the ability of the gear to withstand the high electro-magnetic forces set up by the short-circuit currents.

Left: The transformer before assembly. Right: The assembled transformer showing the winding-movement indicators

It has been found that although the strengths of circuit-breaker enclosures were adequate for breaking the rated kVA associated with their dimensions, the mechanical construction of contacts and current-carrying parts was sometimes not robust enough to withstand the electromagnetic forces due to making or carrying instantaneous straight-through currents. The effect of the distortion and chattering of these parts when tested at full voltage not only imposed severe stresses on the expensive testing constructions but also subjected the test-alternator to exceptionally heavy duty. By obtaining the same test-currents at a low voltage the mechanical strength of current-carrying parts, operating mechanisms, contacts, and so on, can be tested and proved to be satisfactory with comparatively low kVA, so that the stresses both on the test-enclosure and on the alternator are reduced to a very considerable extent.

The new transformer was designed and constructed to the specification of Messrs. A. Reyrolle & Co., Ltd., by Messrs. C. A. Parsons & Co., Ltd., who built and installed both the test alternator and the existing bank of high-voltage transformers. It has two windings per phase, which can be coupled in parallel or in series, and the phases themselves may be connected in delta or in star, so that, by suitable combinations, 440, 760, 880, and 1,520 V may be obtained. The connections are varied by means of links, and the external conductors are differently grouped for each combination. The impedance of the transformer is such that, when it is added to the impedance of the low-voltage circuit through the test apparatus appropriate to each grouping of the windings, the same symmetrical r.m.s. current, about 120,000 A, is obtained at 1,520, 880, and 760 V, and about 80,000 A at 440 V. With a totally asymmetrical short circuit, a maximum peak current of 310,000 A is obtainable in the first half-cycle on one phase.

The transformer is of the "shell" type. To take it out of its tank for inspection is a long and tedious job, as it entails complete dismantling of the somewhat complicated link-connections mounted on the top of the tank; for this reason a device was incorporated in the construction, by which any movement of the windings is transmitted to three indicators fixed to the top-plate. Although approximately 200 tests have been carried out with this transformer, no movement of the windings has been detected other than that occasioned by their first settling down.

American Power Station Tendencies

TYPICAL American power station practice is described in the paper communicated to the INSTITUTION OF CIVIL ENGINEERS by Mr. T. F. Davey, who deals with the Long Beach, California, generating plant.

This station was built to withstand earthquake shocks, and $11,000,000 was spent on it in eighteen months. It was constructed on a "cost plus" basis by a firm who acted as consultants, designers, supervisors, contractors and inspectors. Transmission towers 310 ft. high had to be built to carry the 220-kV lines over a navigation channel, the foundations extending 80 ft. below sea level.

Fuel oil is pumped to underground steel-lined service tanks, from these to the heaters, and thence to the burners. These will use either natural gas or oil, and the boiler-room is designed for the future use of pulverised fuel in the event of the oil-supply from the neighbouring oil-fields running short.

Each of the three boilers supplies 350,000 lb. of steam per hour at 750 deg. F. and 450 lb. per sq. in. The tubes are heated in three passes and the superheater in a single pass. The boilers are equipped with water walls, air preheaters, and forced and induced draught fans, and are automatically and manually controlled. The 94,000-kW turbine is rigidly coupled to a 90,000-kW main generator, a 4,000-kW auxiliary generator, and a stabiliser exciter, the complete unit being 102 ft. long. Four vertical condensers stand one at each corner of the low-pressure section of the turbine, heaters being situated at the same elevation as the turbine floor, while all auxiliaries are on the floor below.

The 16.5/220-kV outdoor transformer bank is air-cooled, and the air space above the oil is filled with nitrogen maintained by oxygen-absorbing breathers. The transmission line and towers cost about $750,000, some of the towers being 260 and 310 ft. high.

The author observes the following tendencies. The value of superheat increases, and the air preheater becomes of greater importance at the expense of the economiser. Plain furnace walls have been replaced by air-cooled and then water-cooled walls; the boiler drum has decreased in relative size, and four stages of feed-heating by bled steam are employed. Open feed-water systems have been replaced by closed systems, necessitating automatic make-up and draw-off equipment. The cubic capacity of boiler and turbine rooms per kW has decreased, as has that of the switch house, but the size of the outdoor switch garden has increased rapidly, owing to the larger transformers, circuit-breakers and clearances required with high transmission voltage. The economy obtainable seems to be reaching a maximum with the present system.

New All-electric Baths at Watford

THE new baths at Hempstead Road, Watford, were opened on Wednesday by the Mayor. Watford claims to be the first town in this country, and possibly in the world, to possess swimming baths, slipper baths, and a laundry, which are all, together with the building itself, electrically heated.

The computed running costs with electricity were compared with known results under other methods taking into consideration other savings due to the former, *e.g.*, in the capital cost of the building, the smaller space required for the electrical plant, and the saving in fuel space (which reduced the length of the building by about 5 ft.), and the elimination of the chimney stack and flue. There are other assets with electricity difficult to express in terms of money.

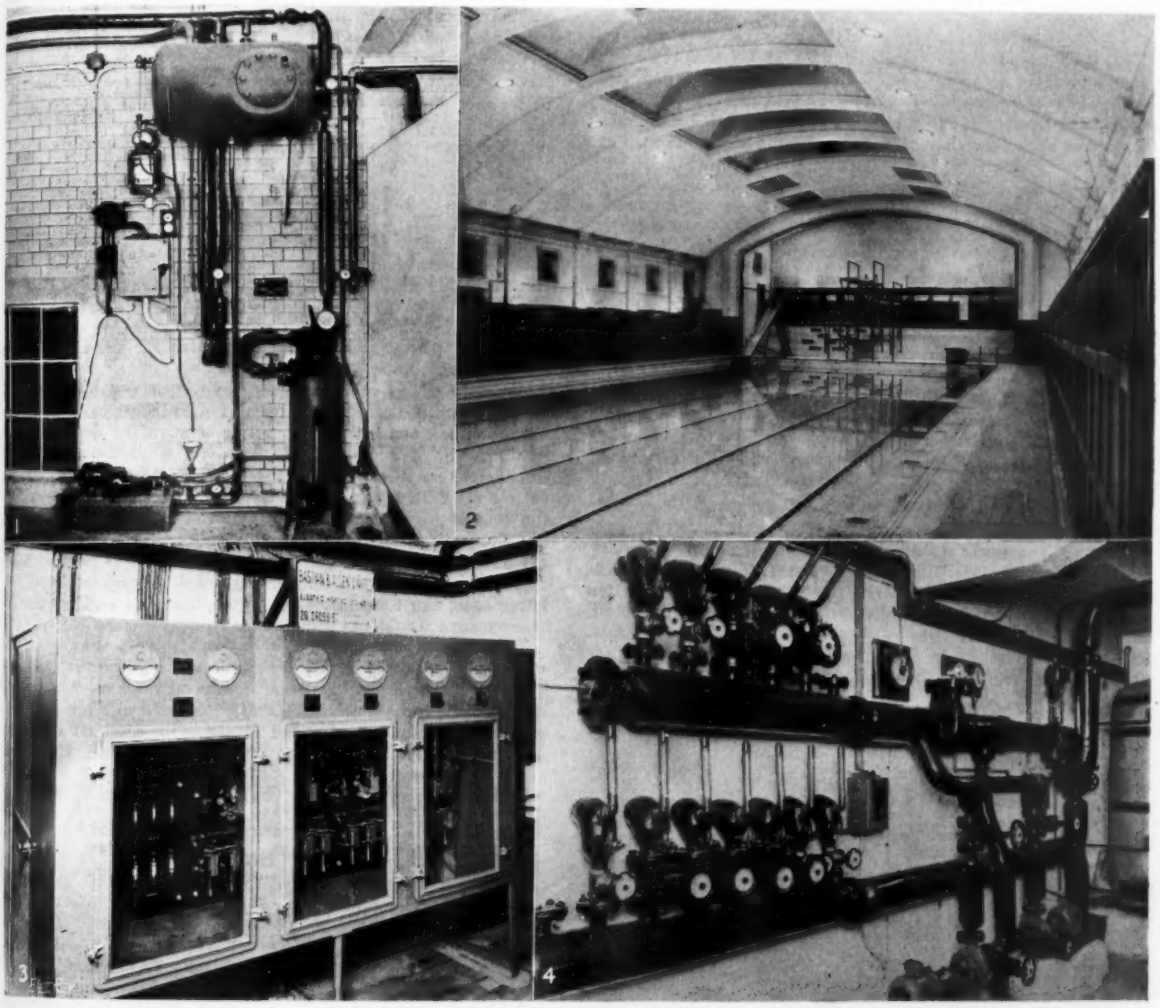
Except for some 15-kW required for the steam and hot water supply to the laundry, all electricity is taken during the night. As the demands for heating the bathing pool, the slipper baths and the building are not made at the same time the load is evenly distributed throughout the year, reaching its maximum during the summer. The total load of the electrode boilers installed is 495 kW, but the maximum demand has been arranged not to exceed 350 kW.

The storage apparatus for the slipper baths works on the "Bastian" system, in which the water enters at a rate proportional to the heating effect. When a large quantity of water has been withdrawn during busy hours, the storage does not fill up with cold water, but the whole of the storage is available as hot water. All the heating is by "Bastian" electrode boilers (which could be placed on a space 6 ft. sq. by 5 ft. high), working in conjunction with a "Candy" filtration plant for the bathing pool, a separate storage for each set of slipper baths (men's and women's) and a separate storage for building heating. Hot water is supplied for the slipper baths from an indirect and specially designed thermal-storage system situated above the main points of draw-off.

The heating of the building is by "Reyrad" panels, "Ideal Classic" radiators and overhead coils. The use of "Reyrad" panels overcame the difficulty of heating the dressing boxes which are made to fold back on to the wall.

A control room houses all the switchgear and automatic equipment. This consists of two main panels, one bearing the three main circuit breakers; the other is the automatic control panel for the whole of the electric heating equipment. The controls are chiefly by time clocks and thermostats. The boiler for heating the bathing pool cannot be switched on unless the circulating pump is working, and if the circulating pump stops the boiler is automatically switched off. The pump, however, can be switched on when required for circulating water from the filtration plant without the boiler being in circuit. The water supply to the slipper bath storages is cut off when the boiler for heating the water is switched off.

The electrode boiler system, with the control and switchgear, was designed and supplied by Bastian & Allen, Ltd. The complete installation was carried out by Messrs. James Combe and Son, Ltd., to the requirements of Mr. W. W. Newman, borough engineer of Watford, who was responsible for the design of the building.



The new "all-electric" swimming bath at Watford. 1. Part of the laundry installation. 2. A general view of the bath. 3. Some of the control gear. 4. Hot water piping, pumps and valves—Bastian electrode boiler on right

Other items of electrical interest include the following: Three Smith's electric clocks; two Sturtevant extraction fans in the roof; three ¾-h.p. automatic Pulsometer pumps with Igranic push-button control; two 9-h.p. B.T.-H. motors driving the centrifugal pumps in the filter room; and a ½-h.p. B.T.-H. motor for the laundry hot-well.

The main baths are illuminated by silvered-glass floodlights recessed in the ceiling above diffusing glasses, the floodlights being fitted with 300-W "Osram" lamps, and also by wall brackets fitted above the cubicles. The main hall receives natural light through eight large G.E.C. laylights. There are also four smaller laylights for artificial lighting in the entrance hall. The G.E.C. also supplied all the lighting fittings for the slipper baths, laundry, offices, &c., and prismatic bulkhead fittings for the subway and passages. Three 1,000-W G.E.C. floodlights are installed above the main entrance. The electrical contractors for this work were Messrs. L. J. Ive, Ltd., who worked to the designs of Mr. Manfield, of the borough engineer's department.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Women or Men Demonstrators?

I understand from "A. C. H.'s" contribution of May 5th that his chief objection to lady demonstrators is that they are taking "a steady job with a reasonable salary" from the young male engineer, but surely women have an equal right to earn their own living as best they may.

If there are women with the technical knowledge and ability to advise consumers regarding their electrical installation and whose salesmanship is up to standard, the supply authorities will naturally continue to engage them in spite of the fact that there are men possibly equally well qualified.

May 5th. WOMAN ENGINEER, B.Sc.

Criticisms of Domestic Apparatus

We have noted with interest the report of Mr. Gamble's paper and your comments on it in your issue of April 7th, and we are glad to see that you do not go so far as to suggest the total abolition of the electrical heating of bathrooms. Panel-heaters are excellent from many points of view, but they are relatively costly and we suggest that a bowl-fire hung from the ceiling out of reach, protected by an effective earthing-connection and a strong guard, and controlled by a double-pole switch, also mounted on the ceiling and operated by hanging cords, is an economical and safe alternative. It is also cheap to install, and solves the problem of bathroom-heating admirably.

British-made hanging bowl-fires of first-class quality are on the market, and it rests entirely with the industry to use the means provided for the avoidance of the risks that Mr. Gamble quite rightly referred to. He ought, we think, to have mentioned, in addition to bathrooms, all other rooms, such as sculleries or kitchens, where there is running water or much earthed metal; and our remarks apply equally to the latter. We hope that this constructive suggestion will be of service in many quarters. A. REYROLLE & CO., LTD.

Hebburn-on-Tyne, *May 5th.*

Lead Welding

I was very interested in Mr. Eyles's article on this subject and its application to cable work in preference to wiped joints, mainly because of the so-called porosity of the metal used for wiped joints, and from a financial point of view. It is seven years since I did some lead-burning on cables, and, whilst not a failure, it did not meet with the approval of several eminent engineers who witnessed the operations of several expert lead-burners.

The Synchronome electric clock in the tower of the Merchant Taylors' School, Rickmansworth

Lead-burning is a very highly skilled job, and applied to cable work it would call for specially designed preparation at the point of fusion to avoid damage to the insulation and for that most difficult operation known to burners as underhand and overhead burning. In plumbers' work most things to be burned are in easy and accessible positions, not so in cable jointing — especially service work. Moreover, lead sleeves and sheathing vary in weight and purity of metal. Real success can only be attained on pure chemical lead; most lead sheathing is now antimonial owing to its marked advantage in resisting vibrational cracking, and many lead sleeves are 50 per cent. dross. The size of the bead or wave is not the whole strength of the seam; the main part is the sweating of the molten lead, inasmuch as both are of the same material—the lead in the seam is really cast lead varying in molecular structure as well as tensile strength.

So far as cable work is concerned lead-burning, whilst not impractical, is unnecessary. A first-class burner can demand and get up to 2d. per hour over the standard plumber's rate and not necessarily be a plumber, and in cable work a plumber will wipe a joint as quickly as, or quicker than, one can be burned. The most marked advantage of burning is protection from corrosion; in cable work all lead work is protected by waterproof compounds. The wiped joint has a dual purpose—continuity of the sheath and a watertight seal, and when cable jointing is recognised as a highly skilled craft and only skilled "plumber-jointers" are employed we shall hear less about porous metal used for wiped joints (which is only made porous by unskilled application) and retain the most efficient and cheapest method.

It must be remembered that 8 oz. of solder applied by the "plumber" who is master of his craft, makes a far more effective and superior joint than the 8 to 10 lb. of solder played about with for an indefinite time by a navvy plumber, who has no conception of the untold damage he is doing to the surrounding parts of sheathing and sleeve. What better proof of the soundness of a wiped joint have we than those which are carrying water at tremendous pressures underground, bare to all chemical actions of the ground? What is needed in the industry is a more comprehensive knowledge of joint wiping, a craft which only years of practice can attain.

Brighton, *May 8th.* WILLIAM MASKERY.

Automatic Fire Alarms

With reference to the recent correspondence on the subject of fire alarms, there appears to be a diversity of opinion as to the suitability of a set type of thermostat calibrated to operate at a fixed temperature in the region of 130/150 deg. or a thermostat made to give an alarm when a sudden rise of temperature takes place, as mentioned by Mr. Blagbrough in the ELECTRICAL REVIEW of April 28th.

The type of thermostatic alarm manufactured by this firm combines both these features, inasmuch as it will give an alarm with a sudden rise of temperature of 20 deg. F., and in the event of a gradual rise will operate at 130 deg. It is considered essential to have these two features combined, so as to cope with two distinct classes of fire, as for instance, in the case of highly combustible material catching fire, and in the alternative case of slow combustible material. In the first instance, considerable damage may be done before a fixed thermostat reaches the temperature of 130 deg., while in the latter case, the thermostat set to operate on a sudden rise of temperature would not function at all.

This combined thermostat is extremely simple, and is contained in a sealed metal case, measuring only 3 in. by ¾ in. by ¾ in. high. It is also inexpensive, and operates on two wires: it is suitable for domestic use, and when used in large business premises, is usually connected in series on a closed two-wire circuit to an indicating board which indicates actually which alarm has operated. ROCHE, LITTLEWOOD & KER,

Liverpool, *May 3rd.* W. Gerald Roche.

Age and Employment

In answering nearly every "Situation Vacant" advertisement of the daily and technical papers one has to state one's age, or must not be over a certain age, the limit generally being forty-five years. A recent advertisement asked for an "Electrical engineer, age about twenty-two years." What could the advertisers expect from a man of this age, who will only just have completed his apprenticeship?

Ordinary house wiring is largely done by youths. There is of course a great excuse for this owing to contractors having to cut their prices, but even so, I contend they should have a qualified man to supervise the work, which in a good many cases there is not; because the job passes the test of the local supply company it does not follow it is good workmanship. If only contractors would combine and employ qualified men and make their prices accordingly, they would not only absorb a lot of unemployed, but they would get a job more satisfactory to their customers and to themselves.

In the case of a maintenance man in a large factory, the responsibility is very great; on him rests the production and output, for he has to avoid as far as possible all breakdowns which cause a loss. The job calls for a thoroughly experienced man who can put things right in the least possible time. Obviously the older he is the more experience he must have had and is therefore fitter to carry out this class of work.

I think it is also unfair to ask a man to state the wages he requires. A man applying for such an appointment has to guess whether he is to be only an assistant, or whether he is to take charge of the installation as well as the extent of the plant, and the responsibilities attached to it. An applicant may be successful and find upon his arrival that the

plant is far larger than he expected, and is worth at least another pound per week. On the other hand had he asked for that extra pound when applying for the position he probably would not have got it.

Some people say the best way out of this wage question is to state the amount received from one's last employers; even so this applies just the same, because one may have been receiving a low wage or a high one. The most straightforward way out of this difficulty is for the firms to state the salary they are prepared to pay, as councils and supply companies invariably do.

Box numbers are another handicap. If advertisers said "letters only," I am sure all applicants would abide by the instructions given in the advertisement and take their chance. The applicant would then have some idea of the locality and whether his application would stand any chance of being successful, because it is known to the writer that there is at least one town that will not employ outside men.

The Lord Mayor (Ald. Sir Percy Greenaway) inaugurating the new international telephone exchange at Faraday Building, Queen Victoria Street, London, on Thursday last week. On his left is Sir Kingsley Wood (Postmaster-General)

I am sure if employers would be more precise it would help us who are looking for a position considerably, not to mention the saving of stamps, paper, time, and the monotonous job of telling the same old story. THANK YOU.

May 6th.

The Electrical Association for Women

As a member who has participated in the work of one of the Association's branches I am entitled to comment on the methods adopted by the organisation. Whilst I have not competed for the Membership Cup, I expect that I have enrolled a larger number of new members in the Provinces than Veda Brice has in London.

My remarks were a result of actual experience in an official capacity of a branch in the area of an undertaking, eighty per cent. of whose consumers are of the hired-wiring class. I am quite at a loss to interpret the views of "London Member," and a new light has been cast on the objects and means of the Association.

In view of their growing importance the Association should assist in educating hired-wiring consumers in all electrical matters.

I do not propose to withdraw from membership but will continue to endeavour to assist the working-class consumer, and if the E.A.W. cannot help, I am sure of actual sympathy in other directions. MEMBER.

May 7th.

I have read with considerable interest the correspondence in your columns, and as a demonstrator member from the very early days of the Association (being No. 9 on the membership roll) I would like to say that my experience has not been the same as the London member who writes in your issue of May 5th.

Much of my knowledge of electrical work was gained from evening lectures arranged by the E.A.W. for women in the industry, which lectures being at 7 p.m. I was able to attend after the day's work. Similar courses of lectures have been arranged every winter. Since the new premises were opened a Demonstrators' Circle has been formed, of which I am secretary. Meetings are held every Monday evening in the Club Room at 7 p.m., and a list of fixtures has been arranged up to the end of May, some evenings being given up to talks by experts in their various fields, and others to discussions by the members themselves on various problems arising from work in demonstration and selling. In connection with this circle, we also have a library dealing with home economics and applied electricity, and this library is available to all demonstrators and saleswomen, whatever their subscription.

I know from my own experience and from that of many of the demonstrators with whom I have come into contact that the Association has, without fee, put many girls into touch with posts in the electrical industry. The Demonstrators' Circle committee is willing and anxious to receive from other demonstrator and saleswomen members suggestions for lectures and visits, and I think I am voicing the opinion of many when I say that we always feel that the staff of the E.A.W. are ready to listen to our problems and to give us the benefit of their help and experience. BEATRICE SWIRE,

Secretary, Demonstrators' Circle Committee.

London, W.C.1, *May 8th.*

Over-voltage Protection for L.V. Networks

It may be of interest if we add to the information in the article on this subject in your issue of April 7th by stating that the apparatus described is one of a range of lightning arrestors developed by Messrs. Merlin & Gerin, of Grenoble, France, and that its success comes from the neat and ingenious way in which the power of the follow-through current to earth is used to blow the arc from the very short arc-gap around a circular blow-out chamber, which has a very rapid cooling effect on the arc.

The principle of the circular blow-out chamber is used throughout the whole range of these lightning arrestors. It has been commercially applied at all pressures between 110 and 660 V, and has been developed for higher voltages. We are in the fortunate position of being able to supply this apparatus.

Hebburn-on-Tyne, *May 5th.* A. REYROLLE & CO., LTD.

Sunray lamps will be used extensively in the Beaumont Animal Hospital, which is to be opened at the Royal Veterinary College, London, next month. Animals as large as horses can be treated; our illustration shows a smaller patient—a cat—enjoying the rays

The Electricity Supply Rifle League

As the result of matches during the period March-April, the leaders in the respective divisions of the Electricity Supply Rifle League are as follows: Division 1, London Power "A"; Division 2, St. James' "A"; Division 3, St. James' "B."

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Pole Boxes

BRITISH INSULATED CABLES, LTD., Prescot, have redesigned their "Tier" type l.p. terminal boxes for pole mounting. The new design is straightforward and free from unnecessary "gadgets." Cast-iron has been used for the body of the box in preference to mild steel, owing to its greater resistance to corrosion.

The new B.I. "Tier" pole-box for 5-core cable

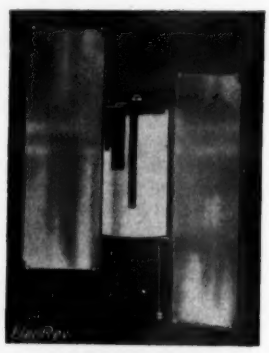
The box is considerably lighter than the earlier type, the overall dimensions having been kept to a minimum. The insulators are of porcelain, in two parts, and are seated on special washers, the two parts being pulled up solid by means of nuts on the stems. Another feature is the easily replaceable outer portion of the insulator. The outlets are spaced 8 in. apart and the box, which is split vertically with a compound-tight gummed joint, can be fixed on either side of the pole by means of reversible straps. A filling plug is fitted near the top of the casting, and a chamber is provided to allow for expansion and contraction of the compound with variations of temperature.

All current carrying parts are of wrought copper, and a bull nose gland is fitted big enough to take the largest cable for which the box is designed. The end of the gland is contracted to suit the smallest size, and intermediate sizes can easily be accommodated by the simple expediency of sawing a short piece off the tip of the gland.

Boxes are available for 4- and 5-core cables, a 4-core box with a blanked outlet being employed with 3-core cables.

An Illuminated Mirror

An attractive illuminated shaving mirror fitting, which lights the face and also serves as a complete lighting unit for the room, has recently been introduced by MESSRS. BERRY'S ELECTRIC, LTD., Touchbutton House, 85, Newman Street, Oxford Street, W.1. The mirrors are arranged to swivel over a wide angle, and the fitting is finished in black and white enamel or chromium plate, the latter being 5s. extra on the standard price of 30s. For a further 3s. it can be obtained with a chain switch lampholder.



The Berry electric mirror wall light

The "Sandalite" Switch Fuse

In last week's issue, owing to a typographical error, we gave the voltage rating of the "Sandalite" switch-fuse as 210 V. This should have been 250 V.

The Callender Radio Service System

What is claimed to be the first complete service system exclusively for radio relay schemes has just been placed on the market by CALLENDER'S CABLE & CONSTRUCTION CO., LTD., Hamilton House, Victoria Embankment, London, E.C.4.

This system has been designed particularly for use on the exterior of buildings and the method of fixing and making connections is very simple. The circular service box is made of high grade "Bakelite," and has a screw-on cover enabling connections to be made from one or two twin 1/.036 in. or 1/.044 in. distributor cables, with one or two twin service cables of similar sizes leaving, thus permitting wiring for dual programme reception when desirable. Connections are made by means of standard single pole small porcelain connectors.

The Callender radio service box

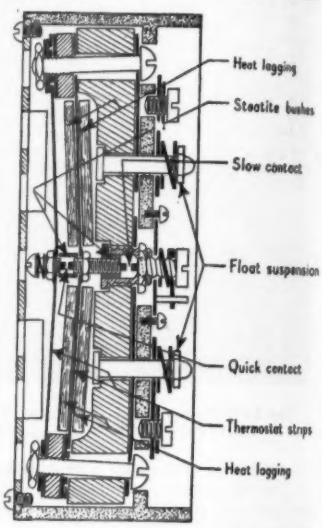
To obtain the necessary continuity for the metal sheathing of the cables, a bonding ring is supplied with three bonding clamps. The clamps are fitted to the ring with a push-on fit and in each clamp a mushroom-tailed screw is used for obtaining a tight continuity connection. "Kalanoid" waterproof plastic is used to fill the box. With this radio service box, it is possible to disconnect the service cable at any time without damage to the remaining cables, connectors, or bonding ring.

A Fire Detector

A new all-British fire alarm demonstrated to us by MESSRS. DONLARM, LTD., 109, Kingsway, W.C.2, is designed to react almost instantaneously to an outbreak of fire.

Two identical phosphor-bronze thermal strips are mounted one in front of the other to form a curved bridge. The foremost strip is affected by quite small sudden increases of temperature, making quick contact by increased curvature following rapid expansion. The rear strip is shielded by a heat insulating sleeve, so that its action is retarded. When the temperature variation is slow both strips expand uniformly; thus the clearance between the "quick" contacts remains constant, final contact being made at a second point which can be adjusted for a range of from 60 to 200 degrees.

Normal clearance between the two contacts is of the order of 0.004 in., so that delay in operation is extremely small. Once adjusted, the device is self-accommodating to slow or quick temperature changes; it will thus work equally well in a refrigerator or hot-house without external manipulation. It is automatically self-adjusting to normal temperature changes, and re-sets itself after giving a warning. The tungsten contact points are specially treated to prevent corrosion, are dust shielded, and enclosed in steatite bushes to prevent spark ignition of gaseous atmospheres. The whole is mounted on the shock-absorber float suspension principle to obviate vibration effects, fitted on a porcelain base, and enclosed in a "Bakelite" case which is of very small dimensions.



A cross section of the Donlarm fire alarm

The detector is suitable for either "open" or "closed" circuit use and the wiring offers two paths, so that even if two wires of opposite polarity are fractured the alarm will still function.

Test blocks provided enable a current to be passed through every wire of an installation for checking purposes, and relays can be made to operate lamps, indicators, &c.

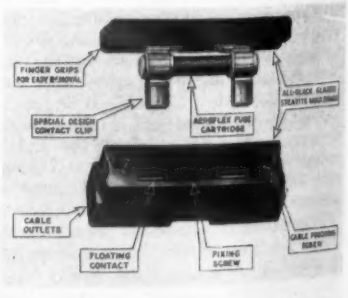
An Electric Bed Warmer

Sufferers from cold feet will be interested in a new product of the SUNBEAM VACUUM CLEANER CO., LTD., 28, Shepperton Road, Islington, N.1—the "Heat-up" electric warm bottle. It takes about ten minutes to attain its maximum temperature of 200 deg. F., an automatic cut-out being provided. In a bed the bottle will keep warm approximately eight hours (the apparatus must not, of course, be connected up when it is in the bed). The price is 21s.

A New Fuse Unit

We have just received details of a new "Aeroflex Fluvent" service cut-out (type AFB) which is rated at 15 A, 460 V, and priced at 21s. 4d. It is supplied with either an "Aeroflex" rewirable cartridge (style "A") or a special form of unfilled cartridge, for use with tinned-copper fuse wire (style "B," 1s. 4d. cheaper).

The complete fuse unit is available in either front or back connected form, and is especially suitable for the protection of domestic and factory type small power units, heating installations, charging panels, neon or other illuminated signs, switchboard instruments, control circuits, etc.



The "Aeroflex Fluvent" type AFB fuse unit

For situations where a high breaking capacity is essential, with a freedom from oxidation, deterioration and inaccurate

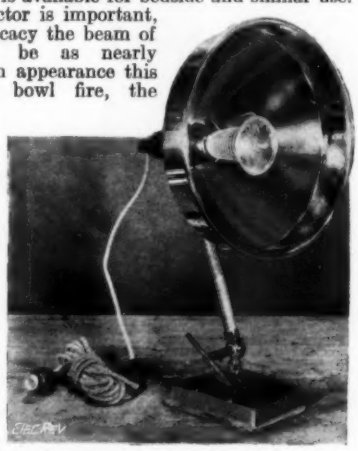
rating, the style "A" cartridge is advised, but in cases where a lower breaking capacity is considered sufficient, and the simplest form of rewiring is desired, the style "B" cartridge can be used.

The back connected slate panel type costs 4s. extra, and the back connected sheet steel panel type 8s. extra. The makers are MESSRS. PARMITER, HOPE & SUGDEN, Fluvent Electrical Works, Vernon Street, Longsight, Manchester.

The "Hala" Infra-red Heater

The therapeutic radiator marketed by HALA (ENGLAND), LTD., 519, Australia House, Strand, W.C.2, at the price of ten guineas, is a simply constructed portable device for use in the patient's home as well as in hospitals and by physicians.

All models are adjustable to any angle, and besides the standard a clip-on base is available for bedside and similar use. The shape of the reflector is important, since for maximum efficacy the beam of infra-red rays must be as nearly parallel as possible. In appearance this radiator resembles a bowl fire, the central element being made for pressures of from 30 to 270 V a.c. or d.c. A double-pole "through-switch" is incorporated in the flexible.



The "Hala" infra-red heater

The infra-red rays emitted have a wave-length between those of the visible red heat rays and the invisible electro-magnetic waves. The mixed-wave element, which has a life of 300 hours, produces a greater sensation of heat than the long-wave element, whose life is 500 hours; one kWh suffices for five hours' irradiation with either of the elements.

Exposure for from ten to twenty minutes at a distance of from 18 in. to 2 ft. is claimed to result in tissue penetration to a depth of 3 in. with a consequent increase of local temperature of at least two degrees. The veterinary applications of these radiators are increasing rapidly.

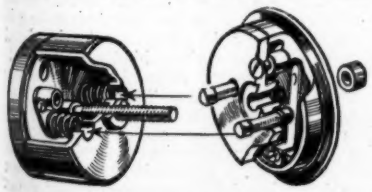
Lampholders for Multi-core Leads

The "Litenlife" lampholder

Bakelite lampholders under the trade name "Litenlife" for use with multicore tough-rubber cables in connection with gala and other temporary illuminations are being introduced by the CENTRAL ELECTRICAL ENGINEERS' ACCESSORIES SUPPLY, LTD., 193, Bethnal Green Road, E.2. With multiple switching, the illuminating effect of a line of lamps can be varied, different coloured lights may be used in succession, or a section of the lamps can be extinguished. These holders are available in the bayonet-cap, Edison screw, or miniature types. The prices have not yet been fixed.

A Fused Clock or Radio Connector

The "Wylex" fused clock or radio connector marketed by MESSRS. GEORGE H. SCHOLES & CO., LTD., Blantyre Street, Hulme, Manchester, offers adequate protection for very low consumption apparatus, such as electric clocks and mains radio sets.



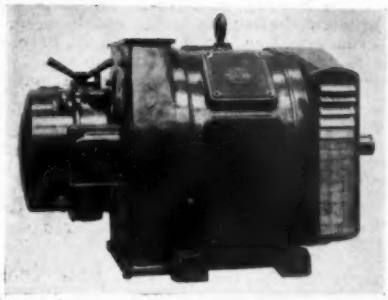
The construction of the "Wylex" clock or radio connector

Although designed on the plug and socket principle, the connection is locked by a knurled nut and so made "permanent." Cartridge fuses afford the necessary protection and at the same time form "pin" connections, the end caps fitting into suitable spring-controlled cups. The connector is of moulded construction and costs 2s.

Industrial Motor Development

The following notes taken during a brief tour of the works of LANCASHIRE DYNAMO & CRYPTO, LTD., Trafford Park, Manchester, afford an indication of the trend of development in motor design.

Special features of the company's gas-works type of motor are that it is absolutely dust-proof; special attention is given to the broad machined flanges on the terminal box, inspection doors, etc.; the terminal boxes are hermetically sealed from the interior of the motor; and a rubber gasket round the shaft at the driving end has a special seal behind it. The motor is made in the ordinary totally enclosed "Tefco" and "C.A.C." (closed air circuit) types.



A Lancashire Dynamo and Crypto louvre ventilated motor with automatically closing louvres

Among the motors under production for mines and collieries we saw equipments with flame-proof slip-ring covers and "M" flame-proof type motors of special design, all made to Mines Department specifications. The "M" class machines have "Maxtorque" rotors to provide the high starting torque and low starting current desirable, and are supplied mainly for use on conveyors, etc. The s.r. mining motor is, of course, used in those positions where direct on-line switching is impossible or undesirable.

A louvre ventilated motor interested us. It is of drip-proof construction and the louvres close automatically when not under the influence of air currents. Windings, etc., being fitted into the casting for a flame-proof constructed conveyor afforded an excellent example of built-in construction. The casting is sent by the machine manufacturer to the motor maker for the inclusion of the electrical equipment. An entirely separate compartment houses the switch. Although the built-in motor is only a comparatively recent product of the company the movement is already developing fairly rapidly.

"Maxtorque" motors have been specially developed for steel works and for live roll work on mills. They are designed for very heavy duties and rapid reversals. In some cases the motors are called on for 1,000 reversals per hour. Other rolling-mill work includes a flywheel motor-generator set.

In the d.c. section, where we saw up to 1,000-kW generators under construction, there was a heavy current negative booster whose very heavy multiple-strip connections arrested our attention. The connections are bracketed on the frame casting of the machine.

New Reflectors

A new line introduced by the SUN ELECTRICAL CO., LTD., 118, Charing Cross Road, W.C.2, is the "Solrae" reflector. Six different types are available, a spreading pendant priced at 23s. 6d., an "interior flood" at 42s. 6d. (including gallery), and the "intensive" and "extensive" types, both costing 19s. 6d. for 100/150-W lamps, and a few shillings less for use with 60-W lamps. Galleries for 60-100-W lamps cost 1s. 6d. extra, and for 150-W lamps 1s. 9d. extra. This range of "Solrae" reflectors replaces the rather more costly "Sterling" types hitherto supplied by the company.

A "Solrae" reflector

Small Automatic Battery-charging Cut-out

The "Dwarf" automatic battery-charging cut-out recently introduced by the RECORD ELECTRICAL CO., LTD., Broadheath, Manchester, utilises a moving permanent magnet, which closes silver contacts instead of the usual mercury cups. The volt coil is connected internally across the contacts, and is energised by the difference between the dynamo and battery pressures, so that when the generator voltage rises above that of the battery the cut-out closes automatically and charging commences.

Increased pressure on the contacts is influenced by a current-coil device. The cut-out opens automatically immediately the charging current is reduced to zero or there is a slight reversal, so that there is no sparking at the contacts. By means of short-circuiting and shunting, with various resistances, different voltages can be catered for by the one style of cut-out. Two back connections only are clearly marked, "Dynamo Positive" and "Battery Positive."

The "Dwarf" automatic battery-charging cut-out

The housing is of black "Bakelite," and through a large window the contact-maker can be seen. The overall dimensions are 2¾ in. by 2¾ in. by 2 in. deep. The current ratings are 2.5, 5 and 10 A, and for up to 10 V the price is 12s. 6d. For 30, 50, 70 and 150 V the extra charges vary up to 5s.

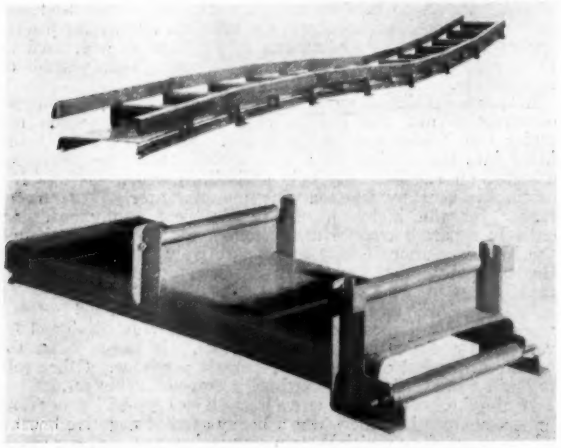
A Protected Plug Socket Improvement

A slight addition to the 15-A 2-pin (round) "Wylex" socket produced by MESSRS. GEORGE H. SCHOLES & CO., LTD., Blantyre Street, Hulme, Manchester, is designed to afford visual indication of the socket entrances. The parts of the cover exposed by the "revolving" shutter when in the closed position are now white and offer a decided contrast to the brown finish of the whole.

An M. & C. Face Conveyor

The recent trend towards larger outputs from intensively mined faces has led to the demand for a new face conveyor, with large capacity, great strength combined with minimum weight, and low running costs, which shall be easy to move forward.

The new face belt conveyor, made by MESSRS. MAVOR & COULSON, LTD., 47, Broad Street, Glasgow, consists of six-

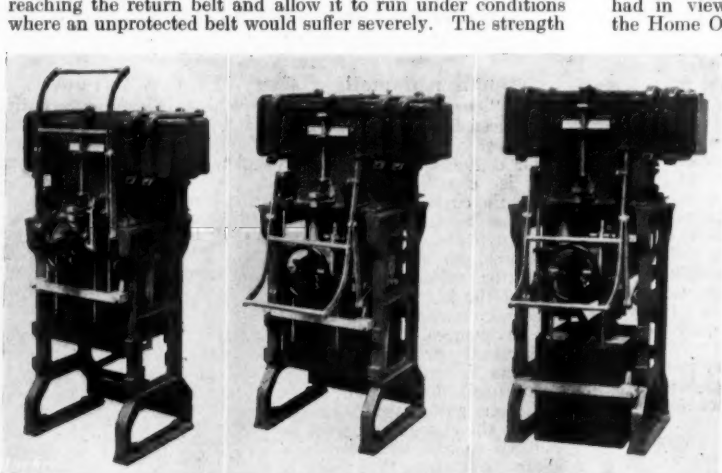


An M. & C. inverted trough with its three rollers in position, and (above) seven units joined together

foot sections, each section consisting of an inverted trough which supports a side plate on each side. These side plates are made of ample section with internal webs, and the angles which support them are so cross-braced that only a fall of roof can distort them or alter the alignment of the rollers. When coal rolls off the face on to the side plates, the load is still carried without distortion.

Each inverted trough with its three rollers weighs less than an ordinary 20-in. shaker conveyor trough, and ease of moving forward is further increased by there being only three pieces for each unit length. The parts are quickly and easily lifted apart and joined together again. Alignment is ensured by each joint being rigid sideways, but the conveyor can be curved upwards or downwards, and easily follows undulations in the floor.

Running costs are made low by the complete protection given to the belt, as the inverted troughs keep all dirt from reaching the return belt and allow it to run under conditions where an unprotected belt would suffer severely. The strength



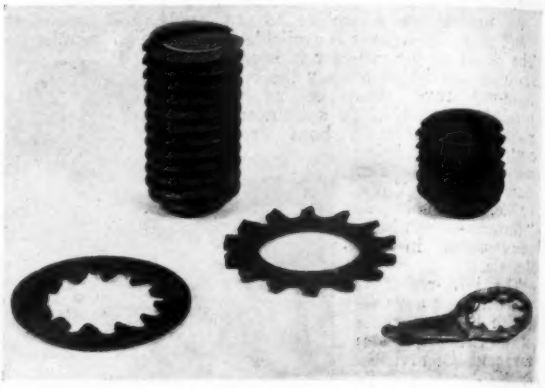
A Switchgear & Cowans isolating switch in the closed, isolated, and tank lowered positions

of the side plates keeps them straight and reduces leakage of small coal on to the top of the inverted troughing. The top belt is carried well above the inverted troughing. Although the face side plate comes low enough to protect the top belt from damage by the fillers, it leaves plenty of room for clearing any small coal off the top of the inverted troughing. As the top belt is supported every three feet, it requires little tension to prevent its sagging.

The conveyor is made for belt widths of 20, 24, and 26 in., and the required capacity can therefore be obtained with the advantage of a low belt speed. The smallest size is also made with a reduced height to the top belt, for use where height for filling is restricted.

Self Locking Set-screws and Washers

The self-locking feature of a set-screw recently introduced by MESSRS. BARBER & COLMAN, LTD., Marsland Road, Brook-



Selections from the range of "Shakeproof" washers, together with a self-locking set-screw depicting the off-setting

lands, Manchester, is brought about by off-setting the two semi-circular sections at the top, divided by the deep-cut screw slot in such a way that the protruding threads works with the screw inwards and against it outwards.

Various sizes are available, and, as with other Barber & Colman products, hardening and tempering play a big part in the successful production and utilisation. By increasing or decreasing the amount of offset the locking action of the screw can be definitely controlled to meet various conditions.

Since producing "Shakeproof" washers the company has extended the ranges as follows: Type No. 11, with external teeth, from No. 4 (about ⅛ in.) to ⅝ in. in thirteen sizes; No. 12, with internal teeth, from No. 2 to 1 in. in fifteen sizes; No. 14, with internal teeth and for heavy duty, from ¼ in. to ¾ in. in eight sizes; No. 15, countersunk, external teeth, from ¼ in. to ⅝ in. in eight sizes; No. 13, round head with internal teeth, from ¼ in. to ½ in. in five sizes. All the foregoing are made of steel, and in addition there are two types made in bronze: No. 18, with external teeth, from No. 4 to $\frac{5}{16}$ in. in four sizes; and similar sizes for No. 19 with internal teeth.

There is an extensive range of phosphor-bronze hot-tinned "Shakeproof" locking terminals, all 0.018 in. thick. For from No. 4 to No. 14 screws there are various types of flat and bent terminals, including some with wings.

H.P. Non-Automatic Isolating Switch

In designing their new h.p. metal-clad oil-immersed non-automatic switch for isolating, grouping or coupling purposes, SWITCHGEAR & COWANS, LTD., Old Trafford, Manchester, have had in view the "visual isolation" feature encouraged by the Home Office.

Actual switch operations and lowering the tank are performed by the same handle. The unit is self-contained and the switch is of the spring-controlled knife type, the springs being adequately protected against short-circuiting in the event of their detachment. An insulated bar completes the switch blades and affords self-aligning contacts. A hand wheel operates the switch, which has "on," "off," and "earth" positions. A top plate carries the switch and supports the operating mechanism, which is housed in a fabricated steel tank with phase separators. The switch and cable box terminals project into a compound-filled chamber above the switch which provides for the coupling of units into switchboard formation.

Three cable boxes can be attached to one unit, one at the back and one at each end of the terminal chamber. Access to the switch is obtained by lowering the oil tank in one of the two types of units available. In the other type, which is slightly more elaborate, the switch unit is isolated by being withdrawn downwards. In the former type a danger notice warns the operator that one side of the switch may be alive. Actual isolation is on the plug and socket principle.

A simple but adequate interlocking system protects the whole equipment. Limited to full-load current for full voltage rupturing capacities, the switches have carrying capacities of up to 300 A at 6.6 and 11 kV.

Indian Electrical Imports

THE Government of India has just issued its annual statement regarding the import trade of British India for 1931-32, giving full details of the countries participating in this trade. From this volume have been extracted the following figures showing the value of electrical apparatus and machinery imported in that year, together with increases or decreases compared with the previous twelve months.

The classification of the lamp group has again been altered, and comparative figures are therefore not available. The value of electrical apparatus (as distinct from machinery) imported was the smallest since 1924-25, the grand total amounting to Rs.2,22,98,000. Great Britain's share was no less than Rs.1,15,28,000, nearly Rs.10,00,000 more than that of all foreign countries together. The total value of electrical machinery imported at Rs.2,16,26,000 was not far below the average of the previous five years, but a disappointing feature was the increase in foreign imports—notably from the United States—at the expense of Great Britain.

	1931-32. Thou. Rs.	Inc. or Dec. as compared with 1930-31. Thou. Rs.
Fans—		
Total	1,950	– 630
From United Kingdom	1,050	– 390
„ Germany	415	+ 115
„ Italy	410	– 270
Wire and cable, rubber insulated—		
Total	2,700	– 990
From United Kingdom	1,780	– 990
„ Germany	400	+ 10
„ Holland	110	– 10
„ Belgium	240	+ 40
Wire and cable, insulation other than rubber—		
Total	2,250	– 2,130
From United Kingdom	1,970	– 1,880
„ Germany	190	– 190
Telegraph and telephone wire and cable—		
Total	95	– 195
From United Kingdom	55	– 105
„ Japan	28	+ 28
Bare copper wire (electrolytic)—		
Total	980	– 1,200
From United Kingdom	530	– 980
„ Germany	230	– 20
„ United States	110	+ 45
Telegraph and telephone instruments and apparatus—		
Total	520	+ 20
From United Kingdom	435	+ 5
Lighting accessories and fittings—		
Total	790	– 150
From United Kingdom	370	– 150
„ Germany	240	+ 20
Meters—		
Total	650	– 20
From United Kingdom	330	– 120
„ Germany	200	– 70
Other instruments, not telegraphic or telephonic—		
Total	200	– 80
From United Kingdom	70	– 50

	1931-32. Thou. Rs.	Inc. or Dec. as compared with 1930-31. Thou. Rs.
Gas-filled lamps—		
Total	1,580	
From United Kingdom	720	
„ Holland	470	
Vacuum lamps—		
Total	1,620	
From United Kingdom	560	
„ Holland	520	
„ Austria	120	
„ Czechoslovakia	110	
„ Japan	200	
Bulbs for automobiles—		
Total	120	
From Holland	60	
„ Czechoslovakia	7	
Bulbs for torches—		
Total	220	
From Japan	50	
„ United States	80	
Wireless valves—		
Total	40	
From United Kingdom	27	
„ United States	10	
Electric lamps, other sorts—		
Total	540	+ 450
From United Kingdom	60	+ 30
„ Germany	50	+ 30
„ United States	170	+ 164
Lamp parts and accessories—		
Total	1,230	– 1,240
From United Kingdom	70	– 70
„ Germany	430	– 520
„ United States	450	– 380
Batteries—		
Total	1,120	– 160
From United Kingdom	200	– 30
„ Germany	150	– 120
„ United States	720	– 30
Accumulators and parts—		
Total	850	– 990
From United Kingdom	620	– 540
„ Belgium	120	– 260

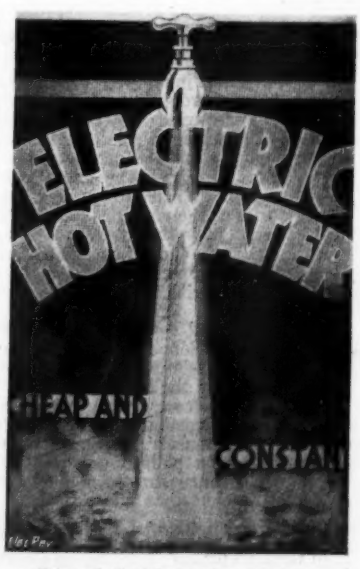
Comparative figures not available.

	1931-32. Thou. Rs.	Inc. or Dec. as compared with 1930-31. Thou. Rs.
Electro-medical apparatus—		
Total	270	– 40
From United Kingdom	65	+ 25
„ Germany	85	+ 10
„ United States	85	– 45
Switchboards, other than telegraph or telephone—		
Total	270	– 50
From United Kingdom	240	– 70
Electrical goods and apparatus, not enumerated—		
Total	3,990	– 1,610
From United Kingdom	2,140	– 850
„ Germany	540	– 260
„ United States	980	– 350
Control and switchgear		
Total	3,530	– 1,050
From United Kingdom	2,990	– 860
„ Germany	200	– 320
Generators, alternators and dynamos—		
Total	4,600	+ 400
From United Kingdom	3,490	– 320
„ Sweden	160	+ 157
„ Germany	310	+ 140
„ United States	510	+ 390
Motors—		
Total	2,990	– 1,430
From United Kingdom	2,260	– 1,230
„ Germany	260	—
„ United States	240	– 220
Transformers		
Total	1,130	– 500
From United Kingdom	700	– 420
„ United States	260	+ 10
Turbo generating sets—		
Total	440	+ 120
From United Kingdom	260	+ 25
Other electrical machinery—		
Total	8,930	+ 170
From United Kingdom	5,300	– 340
„ Canada	110	+ 65
„ Germany	580	– 400
„ Belgium	280	+ 20
„ United States	2,430	+ 850

The E.D.A. Water-heating Campaign

THE British Electrical Development Association has embarked on a national campaign for the development of the electric water-heating business, and a programme is now being circulated to members giving particulars of publicity literature, national advertising, posters, &c. In a foreword to the programme, Mr. A. C. Cramb, the director and secretary, states that this campaign has been planned in response to a general desire throughout the industry. He points out that the water-heating load is most valuable to supply undertakings.

Electricity for water heating is now a practical proposition, and the object of the campaign is to make this fact widely known to the public, and to show that electricity provides the best hot-water service. Builders are also encouraged to make provision for electric hot-water systems in new houses.



One of the Campaign posters

Water heating has long been recognised as one of the most beneficial classes of load, and the Association suggests that there are probably two million houses already connected to the mains of supply undertakings which offer electricity at ¾d. per kWh, or less, every one of which is a prospective user of electrically heated water.

The Association is making a new departure in its scheme of publicity by a series of wireless messages to be broadcast from Radio Paris on Sunday, May 21st, and on the five succeeding Sundays, and also from Fécamp (Radio Normandie). These messages will draw special attention to a book prepared by the Association entitled "Hot Water by Wire," which will be sent to any listener who applies for a copy. The Association has the advantage of the old B.B.C. address, which will be familiar to the majority of listeners.

Suggestions as to how chief engineers, sales managers, consumers' engineers and water-heating specialists of supply undertakings can take advantage of the campaign are outlined in the programme, while hints are given to manufacturers and contractors.

The extensive range of publicity matter prepared includes the book already mentioned, "Hot Water by Wire" (E.D.A. 1090), and an attractive folder (E.D.A. 1091), illustrated by Furnival; both of these are produced in colour. Special posters for outdoor publicity have been prepared, the accompanying illustration showing a typical example. This design is also being used as a poster stamp for letters, envelopes, &c., throughout the period of the campaign.

Special attention is directed to two window displays which have been specially designed for the campaign, diagrams and instructions for which are given in the programme, together with specifications of the materials required.

Local publicity campaigns are essential for the success of the campaign, and the Association has available all the material for a complete local campaign, including Press advertising, booklets, folders, posters, and window displays. A special booklet for the use of salesmen and canvassers has been prepared ("Selling Points on Electric Hot Water," E.D.A. 1069), and a date schedule of national advertising, together with reproductions of national advertisements, are included.

The Royal Society

The annual conversazione of the Royal Society will be held at Burlington House, Piccadilly, W.1, on Wednesday next at 8.30 p.m.

Parliamentary News

(BY OUR SPECIAL REPORTER)

ON May 3rd, in the House of Lords, Lord Falmouth formally moved the second reading of his Electricity Supply Bill. Lord Banbury maintained that the Bill should be rejected. Under Clause 11, he said, if the Minister of Transport agreed, any electricity company could take a piece of a field on a farm and, without a word from the owner, erect on it a building for transforming, converting, or distributing electricity, and the only safeguard was the Minister of Transport. He objected to the habit of making Ministers dictators. Another clause gave a company power to break into a man's house, but there was nothing to say that, when it had so broken in, it must repair the damage. Then there were other provisions which allowed any local authority, company, or person authorised to supply electricity to break up any private street they liked. There was also a clause providing that wherever a person fraudulently used electricity for a purpose other than that for which he obtained it certain penalties should ensue. That was all right, but it was unnecessary.

Lord Onslow, the Chairman of Committees, advised the House to give the Bill a second reading. With the exception of two clauses the measure was founded on precedent. The Bill was a useful one, would obviate a great many clauses in private Bills, and would save expense. Lord Rankeillour said that he had received representations showing that gas companies wished to put forward amendments in Committee. The Bill was of too great a magnitude to be passed that afternoon, and he moved that the debate be adjourned.

Lord Falmouth said that since the war no fewer than four Electricity Supply Bills had been passed. This Bill was far more modest than three of those. It was an endeavour to smooth out certain difficulties which had arisen with the supply of electricity, and which experience had shown required legislation to deal with them. The Bill only sought to apply to the country generally powers in connection with electricity supply which had been conferred on private undertakers. All the clauses in the Bill were clauses which had appeared in private Bills, except Clauses 1 and 16.

Clause 1 was framed to meet a special difficulty; it dealt with the breaking up of streets. Under the 1882 Act electricity undertakers were entitled to break up streets belonging to public authorities on giving notice to those authorities, and any dispute had to be referred to the Ministry of Transport. But the 1882 Act defined what was a public authority, and, as in 1882 county councils were not in existence, there was no mention of them in that Act, which had proved a considerable handicap. The second object of Clause 1 was to deal with streets which were not dedicated to the public and for the repair of which there was no body responsible. Clause 16 was inserted to deal with the question of "stand-by supplies." In the 1922 Act, the question of such supplies was raised, but there was no mention as to how they were to be determined.

Lord Plymouth, on behalf of the Government, said he was informed that the Minister of Transport and the Electricity Commissioners took the view that, in general, the conferring of the powers sought by the Bill should prove of assistance to authorised undertakers in their relations with consumers, and might do something to facilitate electrical development. But the Government could not promise to give facilities for the passage of the Bill into law this session.

Lord Charnwood suggested that it might unfairly prejudice gas undertakings if the powers of the Bill were conferred on electrical undertakers alone. Lord Phillimore said that at present the Central Electricity Board and the electricity supply undertakers were pushing their lines right and left throughout the country, and were crossing innumerable roads and highways. The Minister of Transport, presumably, was the person to whom reference had to be made when the interests of the users of the highways and of the highway authorities came into conflict with the views of the Central Board and the supply undertakers. He feared that there was at present some reason to believe that the influence of the Ministry of Transport was used to promote the interests of electricity rather than those of the highways, and he urged that too great powers should not be granted to electricity supply undertakers without very carefully paying regard to the interests of road users, road owners, and other statutory undertakers.

The Bill was read a second time by thirty-one votes to twenty-one, and, on the motion of Lord Rankeillour, referred to a Select Committee for examination.

The Tax on Heavy Oils

On May 2nd, during the Report stage of the Budget resolutions in the House of Commons, Col. Wedgwood moved that instead of the duty on heavy hydro-carbon oils being 1d. a gallon it should be 15 per cent. *ad valorem*. The use of these oils, he said, had only comparatively recently been adopted, and particularly by progressive firms anxious to improve British products.

Mr. Chamberlain, the Chancellor of the Exchequer, said that he wanted this duty for the purposes of giving a substantial amount of revenue and assisting the home industries of coal, gas and electricity, and the shale oil industry in Scotland. But, when the relative clause in the Finance Bill was reached, he would lend a sympathetic ear to any representations of special hardship that might then be made.

The amendment was withdrawn.

Commercial Gas Bill

The Commercial Gas Bill was dealt with on Wednesday afternoon by the Select Committee of the House of Commons on Unopposed Bills. This Bill follows the lines of one promoted by the Gas Light & Coke Co. to prevent the imposition by local authorities of restrictions as to the form of lighting and heating to be used in houses erected by them. When that Bill was passed petitions against the Commercial Gas Co.'s Bill were withdrawn on the understanding that opposition might be renewed in the House of Lords.

Mr. A. B. Winser, for the promotors, said that the company had been supplying gas for eighty-five years to some of the poorest parts of the country, including areas in the East End of London. It had promoted this Bill to check the activities of the Stepney Borough Council in favouring its own electricity undertaking at the expense of the gas undertaking.

The chairman (Capt. R. C. Bourne) said this was a question of principle which it was really for the House and not for that Committee to decide, and after formal evidence the preamble was found proved and the Bill was ordered to be reported to the House.

In the Courts

MR. JUSTICE LUXMOORE, in the Chancery Division, has directed that the action brought by Marconi's Wireless Telegraph Co., Ltd., against Philips Lamps, Ltd., for alleged infringement of patent shall stand over until the second motion day next sittings.

The postponement of the trial has become necessary owing to the leading counsel engaged in the case being also engaged in the Court of Appeal in another patent action which is expected to last several days.

A Disputed Electrical Contract

In a King's Bench Divisional Court on May 4th, Justices Acton and Finlay had before them the case of Trent Valley and High Peak Electricity Co., Ltd., *v.* Pack, which was an appeal by the defendant from a judgment of Judge Longson, of Buxton County Court.

Mr. Laskie, for the appellant, said that the appeal arose out of a claim for £35 for work done and materials supplied on the basis of a contract for an installation of electrical apparatus which was placed by a written order of May 18th, 1931. The defence was that the moneys were only due when the installation was complete and ready for connection. The appellant said that the installation was not complete as certain things were not done, the gas fittings were not taken down, there was no main switchboard and no connection was made. The cable only ran to a point 130 yards from the appellant's house and was underground. The company desired to carry the cable overhead from that point to appellant's house.

Unfortunately for the parties they made no provision in the contract for connecting up or provision for the employment of an overhead cable in the course of the work. The appellant, the company said, objected on the ground that it would destroy the amenities of her rooms, she carrying on a boarding-house business. The company sued the appellant and the County Court judge gave judgment against her on a ground counsel did not profess to understand. The company said that the installation was complete and ready to connect. The terms of the contract were net cash on completion, and counsel argued that the installation was never completed.

The Court dismissed the appeal with costs on the ground that the company had always been ready and willing to complete its part of the contract, but that the defendant had withheld her consent to the company's doing the final things necessary, and that the judge had taken a common-sense view of the facts, there being ample evidence to support the decision at which he had arrived.

Lamp Companies' Action Settled

In the King's Bench Division on May 8th an action brought by the Lampe Delta, &c., Co., against the Universal Electric Lamp Co. was in the list for hearing before Mr. Justice Swift. When the case was called on Mr. Cecil Havers, for the plaintiff, said that terms had been arranged, the terms having been endorsed on Counsels' briefs. A sum of money had already been paid to the plaintiffs.

Mr. Wedderburn for the defendants said that they had a counterclaim, but that had now been withdrawn.

Electrochemical Installations, Ltd.

In the Companies' Winding-up Court, Chancery Division, on Monday, Mr. Justice Eve had before him a petition for the compulsory winding up of Electrochemical Installations, Ltd.

Counsel said that the position was that the company had come to an agreement with regard to the petitioning creditor's debt, but that there were terms with regard to a guarantee to be executed.

The matter was adjourned for twenty-one days for this to be carried out.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

Committee "D"

At a recent meeting of the E.C.A. Council the director, Mr. L. C. Penwill, reported that as a result of meetings of the Fair Trading Committee (Committee "D") "a state of finality was being approached." It was the intention of the committee to consider its last meeting the final meeting, and to issue the draft trading policy immediately for consideration by the various industries affected. The draft of the policy had been received, and the three main aspects were the recognition of a National Trading Register, an increased trading sphere for the electrical contractor, and a definite differentiation between the price to the user and the price to those purchasing for resale. All complaints regarding unfair trading tactics would, failing settlement between the associations affected, be referred to a central authority and he visualised the chief work of that authority to be the compilation of a National Trading Register.

The British Glass Convention

A brochure giving the full programme of the third British Glass Convention which is to be held at Buxton from May 18th to 20th has now been issued, and copies may be obtained from the hon. secretary of the Convention, Mr. Geoffrey Marchand, Norwich House, 13, Southampton Street, High Holborn, W.C.1.

Manchester Accepts Local Tenders

Contrary to the recommendation of the chief electrical engineer, the Manchester Council has decided to accept the tenders of two local companies, the Metropolitan-Vickers Electrical Co., Ltd., and Ferranti, Ltd., for the supply of static transformers required by the Electricity Department during the next twelve months. The total value of the contracts was £16,149, which was £3,343 above the figure quoted in the tender of a Wolverhampton firm for the same work. The acceptance of the Wolverhampton firm's tender was favoured by the engineer, but a motion to refer the matter back for further consideration was defeated by 52 votes to 48.

Conditions in Sumatra

A survey of the economic situation on the East Coast of Sumatra has been issued by the Department of Overseas Trade.

The F.B.I. Business Forecast

The far-reaching effects upon the future of international trade of the abandonment of the gold standard by the United States are stressed in the "Business Forecast" published in the Federation of British Industries' "Business Barometer." The devaluation of the American dollar is an event unique in the financial history of nations, and the shock administered to world finance is likely to have momentous consequences. If the policy which is understood to be behind that action is proceeded with, we must prepare for a progressive breakdown of the existing structure of America's international contracts and ihstruments of indebtedness with what ultimate outcome no one can predict. Unless complete chaos is the best prelude to renewed order, it augurs ill for concerted action to restore trade and finance on an international basis. For the time being we must be prepared for a period of renewed instability which cannot help disturbing prices and the placing of forward contracts. But, taking the long view, British trade has no cause to be seriously perturbed by the course of events in the United States. New York has been eliminated as a rival banking centre, and the world's faith in American financial and commercial institutions has received a severe set-back. This means that, provided prompt and courageous steps are taken to deal with any special emergencies with which America's actions may face British commerce in the immediate future, we may look forward to growing confidence in the standing of our country in the markets of the world.

Trade Opportunities in Spain

Opportunities for the expansion of British trade in Spain are analysed in a recent Department of Overseas Trade report on economic conditions in that country. It is stated that one of the principal handicaps to the supply of electrical goods from the United Kingdom is the absence in Spain of properly financed and equipped selling organisations controlled by British trade interests; foreign competitors have in many instances established these facilities. There are also difficulties arising from packing and transport expenses and from the existence of local Spanish industries. In small electrical generators, motors, ventilators, transformers, and magnetos the overwhelming proportion of the trade goes to Germany, France, and the United States, and in these cases, in particular, British exporters are advised that the remedy lies in the establishment of proper distributing organisations in Spain. A "quality" appeal is advocated for increasing the sale of British electrical installation materials, this class of goods being supplied almost entirely from France. The meter trade is held by Germany, Switzerland, and France, the United Kingdom providing only about 1 per cent. Summing up future prospects, it may be said that British goods are appreciated on a quality basis by the Spanish buyer, and hopes of improving trade will become brighter with the gradual strengthening and increasing stability of the political structure.

Conditions in Siam

A report published by the Department of Overseas Trade on the economic conditions in Siam says that while the country has by no means escaped the general depression it is in a healthier position than many of its neighbours. Siam's decision to remain on the gold standard after Great Britain had departed therefrom is stated to have affected trade adversely, particularly with regard to exports.

The Paris Trade Fair

There will be 8,000 exhibitors from thirty-two countries at the Paris Fair which opens to-morrow, and the Machinery and Electrical Sections will be two of the principal features, covering 240,000 sq. ft. of hall and 160,000 sq. ft. of open space. Information regarding the Fair, which will continue until May 29th, may be obtained from the Paris Trade Fair, 143, Fleet Street, E.C.4 (telephone, Central 9683).

The Trade Marks Committee

The Trade Marks Committee, which was set up in January last under the chairmanship of Viscount Goschen to consider and report whether any, and, if so, what, changes in the existing law and practice relating to trade marks were desirable, is continuing its meetings for the purpose of hearing evidence from interested persons and associations. Seven meetings of the Committee have taken place, and during the next few weeks evidence will be taken from representatives of the Trade Marks, Patents & Designs Federation, Ltd., the Trade Mark Owners' Association, Ltd., and the Chartered Institute of Patent Agents. Any persons or associations who desire to submit any further suggestions, or to give evidence, should notify their intention to the Secretary to the Committee, Mr. R. W. Luce, Industrial Property Department, Board of Trade, 25, Southampton Buildings, W.C.2, not later than June 3rd.

Though having a mediæval appearance this is actually the up-to-date factory of Messrs. Walter Grafton & Son, Ltd., at Eltham, where "Walligraph" lighting fittings are made. There are four acres of gardens and playing fields for the employés.

British Shopping Week in Finland

Finland is one of the countries which has recently shown an active desire to adjust her balance of trade with the United Kingdom, and, in order to promote the sales of British goods which must make their appeal to the Finnish housewife, arrangements are now being made, at the suggestion of the Finns, to hold a British Shopping Week throughout Finland from September 4th to 11th next, during which many of the best shop windows in Helsingfors and other important centres will concentrate on the display of British goods. The Prince of Wales and the President of the Finnish Republic have both consented to be patrons. The project, which is being organised in Finland by a special committee under the auspices of the Finnish-British Trade Association and H.M. Legation in Helsingfors, is receiving support and encouragement from

the Department of Overseas Trade, and a "British Week in Finland Committee" has been set up in London, under the joint chairmanship of Sir Alan G. Anderson and Mr. G. A. Gripenberg, to deal with questions arising in this country. Manufacturers interested are invited to communicate with the Committee at 35, Old Queen Street, London, S.W.1.

The Lighting of London's Underground

The opening of Piccadilly Station some five years ago set an entirely new standard in the lighting of London Underground Railway stations. It will be remembered that the General Electric Co., Ltd., supplied the fittings for the very fine system of escalator and escalator landing lighting at this station, and since then similar systems have been installed at a number of other stations. At the reconstructed Hyde Park Corner Station a striking luminous beam system of overhead lighting has been put into operation in the booking hall, while the Marble Arch Station employs 220 ft. of luminous beam lighting; the latter installation, instead of being fixed at a distance from the walls, as at Hyde Park, is disposed at the junction of the walls and ceilings, and gives an impression of greater space. The booking hall at Manor House Station has a rather low ceiling of fibrous plaster arranged in a series of irregular circles, and for lighting this 24-in. flat opal dish ceiling fittings were selected to harmonise with the ceiling formation. At Arnos Grove there is a lofty booking hall with a domed ceiling supported by a large central column, at the base of which is situated the booking booth. On the roof of this "Gecoray" silvered glass reflectors have been mounted to throw the light upward on to the ceiling, to be reflected downwards for the general lighting of the hall. This lighting is augmented by a number of G.E.C. moulded opal bracket fittings around the walls. A "Claudegen" neon sign supplies exterior illumination at Sudbury Town Station, and there are other interesting installations at Turnpike Lane and Bounds Green Stations. Some of this lighting was illustrated in our last issue (p. 623).

Neon Display at a News Theatre

An excellent example of the artistic effects obtainable with neon lighting is to be seen at the Rialto News Theatre, Coventry Street, London, W. A new display installed there illustrates a setting sun throwing its reflection across the sea, the whole being surmounted by blue clouds. The tubes representing the sun are supported by a backboard which gives it a fiery, vivid effect. To illustrate the sea, wavy neon tubes are used, alternately green and blue, except in the central section, where the colour is alternately orange and deep red to suggest the sun's reflection. The total area of the display measures 28 ft. wide by 48 ft. high. The installation was carried out by the Franco-British Electrical Co., Ltd.

An artistic neon display at the Rialto News Theatre, London

Trade Announcements

Electrical Installations, Ltd., has moved to larger premises at 65, Vincent Square, S.W.1 (telephone, Victoria 5915).

The Saxonia Electrical Wire Co., Ltd., has appointed Messrs. Meredith & Hill, 81, Islington Row, Birmingham, as its representatives in the Midlands. Mr. de Lissa will attend to all inquiries.

Mr. H. J. Creffield, electrical engineer, announces that his lighting and heating installation business is now being carried on at 75, Bexley Road, Erith.

Messrs. F. V. Williams & Co. has moved to larger premises at 6, Blackfriars Road, S.E.1; the telephone number remains unchanged.

Mr. A. W. J. Bedbrook, Grand Buildings, Trafalgar Square, W.C.2 (telephone: Whitehall 2201), has taken over the London agency of Messrs. Russell Edwards & Co., Ltd., Bamber Bridge, near Preston, for their cast-iron pipes and specials.

New Municipal Showrooms

The Torquay Corporation has authorised the electrical engineer and the borough engineer to prepare plans for the erection of showroom and office accommodation upon the site now occupied by the old Y.M.C.A. premises.

The Watford Town Council has received sanction to a loan of £3,500 for the provision of an electrical showroom and office at Hemel Hempstead. A sub-station and premises for the cooker and meter departments are to be erected in St. John's Road, Watford, at an estimated cost of £3,909.

The staff of Messrs. Alex. J. Laurenson, electrical engineers and contractors, outside what is said to be the most northerly electrical shop in the British Isles at Market Street, Lerwick, Shetland.

Blackpool Electricity Committee has appointed a special committee to report upon the proposed acquisition of premises for showroom purposes.

The East Ham Electricity Committee has approved plans for extensions of offices, stores, and workshops for the Electricity Department in Nelson Street.

Electricity at a Brighton Exhibition

Electrical traders have taken full advantage of their opportunity of advertising at the Modern Home and Building Exhibition now being held at Brighton, and there is not a single instance of coal gas or oil being represented for either heating or lighting. The Brighton and Preston Relay Station, Ltd., has an attractive stand containing general electrical apparatus, examples being on view of the latest neon tube lighting made by Messrs. Allen West & Co., Ltd. Messrs. Galliers have a good range of modern electric fires, and the British Electric Domestic Appliances is showing its "Mary Ann" vacuum cleaner. The British Vacuum Cleaner & Engineering Co., Ltd., is displaying a complete range of its products; the Whirlwind Co. also shows vacuum cleaners; the Henderson Electrical and Wireless Service exhibits its "Keyway" switchgear, comprising main switches, switches and fuses, switch splitters, cooker control panels, &c. Messrs. Galliers were responsible for the lighting of the exhibition and of the model house, and the operation of a clever model of Brighton sea front, with moving yachts, speed-boats, &c.

Furnace Demonstrations at Leeds

In co-operation with the Leeds Electricity Department and the Yorkshire Electric Power Co., Wild-Barfield Electric Furnaces, Ltd., is arranging a demonstration of the most modern types of electric heat-treatment furnaces at the power station, Redcote Lane, Kirkstall Road, Leeds, from May 17th to 27th.

Visit to Exide Works

Officials of the Bury (Lancs) Corporation visited the Clifton Junction Works of the Chloride Electrical Storage Co., Ltd., on May 3rd. The visit was organised by the company's Bury service agents, Messrs. Auty & Lees, and the party was shown the processes of manufacture of batteries from the small unit for miners' hand lamps to the heavy telephone and central-station batteries and those used in submarines. The party was entertained to tea by the company.

Heat-resisting Flexible Cords

Since the paper on "The Overheating of Flexible Cords" was read at the Institution of Electrical Engineers on April 20th electrical men seem to have given more thought to this subject than hitherto. Given reasonable usage there are now available rubber insulated flexible cords suitable for the high-temperature-generating lamps and fittings now commonly used. In this connection W. T. Henley's Telegraph Works Co., Ltd., draw our attention to their "Pyrobest" flexible cord. This, they state, has been subjected to severe tests which prove its suitability for the work for which it is manufactured. After "ageing" tests for three weeks in a constantly maintained temperature of 100° C. the cores were subjected to a flexing movement backwards and forwards over rollers to exaggerate the distortion which might be experienced in practice when cleaning or changing lamps. During

this treatment 1,000 V was imposed between the cores, but no breakdown occurred when 2,000 flexings had been registered. A water mist was then sprayed on the samples while the flexing was continued for another 1,000 operations under the spray. No electrical or mechanical breakdown occurred. These cords are manufactured in different types for different conditions.

Recent Contract

Messrs. Davis Myer & Co. have secured the contract to rewire the shop windows and carry out renovations to the electrical installation at the Galeries Lafayette, Regent Street, W.1. The window lighting consists of 3,700 reflectors, with a total load of 370 kW. These are being rewired with asbestos-covered heat-resisting cable of Pirelli-General manufacture.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances :—

CHEMICALS, ETC.	Price May 10th	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£40	—
a Ammonia, Muriate (large crystal) ... ,,	£38	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate	£19 15s.	—
a Potash, Chlorate ... ... per lb.	3½d. to 4½d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac T.N. ... ... per cwt.	£3	—
a Sulphur Commercial ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3½d. to 3¾d.	—
a ,, Crystals... ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil ... ,,	1/2 to 2/9	—
b Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£152	—
Grade II ... ... ,,	£107	—
Grade III ... ... ,,	£57	—
c Brass (rolled metal 2" to 12" basis)... per lb.	7¼d.	¼d. inc.
c ,, Tubes (solid drawn) ... ... ,,	8½d. to 9d.	—
c ,, Wire, basis ... ... ,,	7¼d.	¼d. inc.
c Copper Tubes (solid drawn) ... ,,	9½d.	—
c ,, Bars (best selected) ... per ton	£63	£2 inc.
c ,, Sheet ... ... ,,		
c ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£34 5s.	—
d ,, ,, Sheets ... ,,	£64	—
d ,, ,, Wire Rods ... ,,	£45 10s.	£1 inc.
d ,, ,, H.C. Wire ... per lb.	7 7/8d.	¼d. inc.
f Ebonite Rod... ... ... ,,	1/3 to 1/6	—
f ,, Sheet ... ... ,,	1/3 to 1/6	—
e German Silver Wire ... ... ,,	2/2	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para fine ... ... ,,	4½d.	¼d. inc.
i Iron, Pig (Cleveland No. 3)... ... per ton	62/6	—
i ,, Wire, galv. No. 1, P.O. qual. ,,	£20	—
g Lead, English pig ... ... ,,	£13 10s.	£1 inc.
g Mercury ... ... per bot.	£8 to £9 5s.	15s. to £1 15s. dec.
c Mica (in original cases) small ... per lb.	6d. to 3/6	—
c ,, ,, medium ... ,,	4/- to 8/-	—
c ,, ,, large ... ,,	8/6 to 17/6 & up	—
p Phosphor Bronze, plain castings ... ,,	1/1	—
p ,, ,, drawn bars & rods ,,	10½d.	—
p ,, ,, rolled strip & sheet ,,	10½d.	—
p ,, ,, wire ... ... ,,	11½d.	—
c Platinum ... ... per oz.	£7 15s.	5s. inc.
d Silicium Bronze Wire ... ... per lb.	8½d.	½d. inc.
r Steel, magnet, in bars ... ... ,,	7½d.	—
g Tin, Block (English)... ... ... per ton	£183 5s. to £185 5s.	£9 10 inc.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	3/2	3d. inc.

Quotations supplied by :—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. F. Dennis & Co.

Messrs. James Forster & Co. report that the lead closing prices on May 5th were 17s. 6d. per ton higher on the week, but apart from sympathy with other metals, particularly copper and tin, there seems no particular reason for the advance. The inflationary experiment in the U.S.A. should not have any effect on sterling prices as the market there is protected by a high tariff and U.S. stocks are almost sufficient for a year's consumption.

Social Events

The annual sports and gala of the General Electric Co., Ltd., will be held at the company's London sports ground, Preston Road, Wembley, on June 10th at 2 p.m. A large number of challenge cups are offered for competition.

The annual dinner of the Association of Old Cromptonians, which was held at the Hotel Victoria on Friday last, was attended by over 100 members and guests. Of these, no fewer than twenty had been associated with Crompton & Co. prior to 1896. Col. Crompton presided and among the guests were Mr. Frank Parkinson, Lt.-Col. K. Edgcumbe, Lt.-Col. C. Hardie, Messrs. J. Swinburne, E. J. Fox, E. C. Holroyde, E. H. F. Reeves, J. W. Meares, S. L. Brunton, Claude Crompton, and many more well-known members of the industry. The toast of the President was proposed by Mr. J. W. Meares, who referred to two honours recently conferred on Col. Crompton—his election as a Fellow of the Royal Society, and the naming after him of one of the 3,000-ton colliers ordered to supply Battersea power station. Col. Crompton attributed no little of the success of the company to the fact that "we liked our men and they liked us." Mr. J. Swinburne proposed the toast of the Company, and Mr. Frank Parkinson, who replied, paid a tribute to its founders and its keen band of "Young Cromptonians."

The first football eleven of Venner Time Switches, Ltd., has just completed a very successful season, reaching the finals in three important events. They were the winners of the Burdett-Coutts Cup and the Wilson Cup, and with Harrod's Stores share the championship of the league of which they are members.

The Chelmsford Football Club of Messrs. Crompton Parkinson, Ltd., has just finished a very successful season. For the first time for twenty-five years it has won the North Essex League Championship (Division I), and in sixteen matches has dropped only two points, having won thirteen matches and drawn two. The Club has also headed the Chelmsford League for the second year in succession.

The new hard courts belonging to the Tennis Section of the Benjamin Social and Athletic Club were opened on April 29th by Mr. Guy Campbell, the managing director and president of the Club. Messrs. Dumont and Iliffe, both directors of Benjamin Electric, Ltd., were also present. The courts possess a fine pavilion and are very much appreciated by the members of the Club.

Mr. Guy Campbell, with Messrs. Iliffe and Dumont, addressing members of the Benjamin Tennis Club at the opening of the new tennis courts

A Belgian Contract

In our "Electricity Supply Notes" on January 20th reference was made to an Alsthom 45,000-kW turbo-alternator which has been installed by the Société de L'Union des Centrales du Hainaut at its generating station at Quaregnon. Our attention is now drawn to the fact that it was only the steam end of this set which was supplied by the firm in question, and that the alternator was manufactured by the Ateliers de Constructions Electriques de Charleroi.

New Catalogues and Lists

Igranic Electric Co., Ltd., 149, Queen Victoria Street, E.C.4.—Leaflets Nos. 520 and 1720, dealing respectively with push-button control for motor-driven planers and vertical slotters, and with brake solenoids.

Albion Drop Forgings Co., Ltd., Foleshill, Coventry.—An illustrated leaflet of the company's products.

Siemens Electric Lamps & Supplies, Ltd., 38-39, Upper Thames Street, E.C.4.—A folder giving particulars and prices of "Quadray" glass cube fittings.

British Thomson-Houston Co., Ltd., Rugby.—An illustrated brochure (No. D.L.H. 74486-1) on sound-amplifying equipment.

Venner Time Switches, Ltd., Kingston By-pass Road, New-Malden, Surrey.—List No. X.112, describing the Venner oiling outfit.

Sturtevant Engineering Co., Ltd., 147, Queen Victoria Street, E.C.4.—A 40-page general catalogue (No. 1237) of Sturtevant products.

W. C. Davey & Co., 176, Tottenham Court Road, W.1.—An illustrated catalogue of "U-N-I" telephones and other of the company's products. A number of new designs are announced.

W. T. Henley's Telegraph Works Co., Ltd., Holborn Viaduct, E.C.1.—Catalogue No. W.A.3, describing new types of "overground" disconnecting boxes. Also lists containing particulars of h.p. and l.p. insulated cables.

English Electric Co., Ltd., Queen's House, Kingsway, W.C.2.—Publications relating to ultra-rapid current limiters, arc-welding sets, flameproof transformers and switch units, and mining type control and speed regulating equipment for slip-ring induction motors.

Mather & Platt, Ltd., Park Works, Manchester.—Copies of the "Sprinkler Bulletin" containing particulars of the company's fire extinguishing apparatus and of buildings in which this plant has been installed.

Ellison Insulations, Ltd., Perry Barr, Birmingham.—List No. 405 on fabric "Tufnol" for gears, and also a leaflet containing hints on machining "Tufnol."

Benjamin Electric, Ltd., Brantwood Works, Tariff Road, Tottenham, N.17.—A leaflet drawing attention to a modification in the Benjamin "B" transformer.

Multitone Electric Co., Ltd., 95-98, White Lion Street, Islington, N.1.—Particulars of "Bepu" radio transformers.

Brierley, Sons & Co., School Street, Newton Heath, Manchester.—A booklet illustrating various types of dust- and fume-removing plants.

Fescol, Ltd., 101, Grosvenor Road, Westminster, W.1.—An illustrated brochure dealing with the industrial applications of chromium plating by the Fescol process.

Ateliers de Constructions Electriques de Charleroi, 56, Victoria Street, S.W.1.—Catalogue No. 461 dealing with small three-phase motors.

James Neill & Co., Ltd., Napier Street, Sheffield.—A leaflet describing "Eclipse" hacksaw frames.

Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester.—Publications on pumping equipment (7860/3), d.c. mill motors (18/1-1), air-break switch starters (53/1-1), and outdoor "Transwitch" portable sub-stations. Also new and revised leaflets for inclusion in the company's control gear, motor, instrument and meter, and switchgear catalogues.

Bankruptcy Proceedings

V. Gray, wireless dealer, 4, Young Street, Doncaster.—The first meeting of creditors was held on May 3rd at the Official Receiver's offices, Figtree Lane, Sheffield, when the matter was left in the hands of the Official Receiver, as trustee. Debtor had prepared a statement of affairs which showed ranking liabilities of £204 and a deficiency of £139.

H. L. Kinvig, electrician, 167, Jeffcock Road, Wolverhampton, Staffs.—The first meeting of creditors was held on May 3rd at the Official Receiver's office, 159, Great Charles Street, Birmingham, when a statement of affairs was presented which showed a deficiency of £131. The failure was attributed to want of capital and loss on trade. The matter was left in the hands of the Official Receiver as trustee.

H. E. Hewitt, electrical engineer, 55, Park Road, Hornsey, N.—The public examination was held on May 4th at the London Bankruptcy Court, the accounts showing total liabilities of £779 (ranking £710) and net assets of £23. The failure was caused by ill-health, depression in trade, and heavy law costs in relation to freehold property at Muswell Hill. The examination was concluded.

B. Roberts (Auto Electrical Co.), electrical engineer, Tymawr Street, Aberavon, Port Talbot.—Receiving order made April 29th on debtor's own petition. First meeting, May 15th, at the Official Receiver's office, Government Buildings, St. Mary's Street, Swansea. Public examination, June 12th, at the County Court, Neath.

L. G. Cooper, electrical engineer, "Dunarden," Rossall Beach, Cleveleys, near Blackpool.—Public examination, June 2nd, at the Court House, Blackpool.

C. I. Bentley (Traders' Electric Lighting Supply), electrical factor, 9, Fish Street, Hull.—Public examination, May 15th, at the Guildhall, Hull.

C. A. Brown, wireless and electrical engineer, 36, Leagrave Road, Luton.—Last day for receiving proofs for dividend May 16th. Trustee, Mr. P. S. Booth, Kimberley House, Holborn Viaduct, E.C.

A. Peat, electrical engineer, White Hart Street, Mansfield, Notts.—Last day for receiving proofs for dividend May 17th. Trustee, Mr. L. A. West, 22, Regent Street, Nottingham, Official Receiver.

J. Mellanby, electrical engineer, Mystery House, Cambridge Road, Waterbeach.—Receiving order made May 3rd on debtor's own petition.

H. Bannister (Henry Bannister & Co.), electrical goods factor, 48, Old Moat Lane, Withington, Manchester.—First dividend of 1s. 3d. in the £, payable May 18th, at the trustee's office, 20, Booth Street, Manchester.

G. Howard, the younger, electrical engineer, 10, Alford Grove, Sprowston, Norfolk.—First and final dividend of 1s. 3d. in the £, payable May 6th, at the Official Receiver's office, 4, Eastbourne Place, Prince of Wales Road, Norwich.

Company Liquidations

Edison Bell, Ltd., Glengall Road, Peckham.—The accounts lodged under the compulsory liquidation of this company show total liabilities of £90,255 (ranking £44,411), assets of £54,723 (subject to preferential claims of £1,185 and debentures of £44,171), a deficiency of £35,045 in assets to meet the liabilities, and a total deficiency of £335,045 with regard to contributories, the issued capital amounting to £300,000. The company was formed in 1909 to carry on business as manufacturers of and dealers in gramophones, records, and electrical appliances, and the failure was partly attributed to the fact that the wireless branch could not be fully developed for want of capital. The following are the principal creditors: Associated Copyrights, Ltd., £393; Anchor Chemical Co., Ltd., £580; Barrenger, Wallis & Manners, £337; G. Bushey, £309; W. S. Caines, Ltd., £1,077; Crossley & Co., Ltd., £1,558; Cartwright Zack, Ltd., £634; Colvern, Ltd., £351; County of London Electric Supply Co., Ltd., £1,114; Darwins, Ltd., £3,673; Edison Swan Electric Co., Ltd., £641; Effingham Steel Works, Ltd., £219; J. Edwards, £256; R. H. Filmer, Ltd., £220; General Electric Co., Ltd., £1,327; Thos. Hough, £253; Wm. Hall & Co., Ltd., £2,480; Harrison & Sons, Ltd., £342; A. Isaacs & Sons, £2,823; King & Jarrett, Ltd., £596; L.M. & S. Railway, £259; Le Carbone, £222; London Electric Wire Co. & Smiths, Ltd., £515; McCorquodale & Co., Ltd., £849; Marconi's Wireless Telegraph Co., Ltd., £1,448; Mullard Wireless Service Co., Ltd., £550; W. MacCarthy & Sons, Ltd., £306; Jas. Neill & Co., £213; R. F. Robbins, £249; J. Robertson, £574; G. L. Scott & Co., Ltd., £377; Telegraph Condenser Co., Ltd., £266; Thompson & Norris Mfg. Co., Ltd., £431; R. G. A. Voight, £240; H. Wright & Co., £490; Wendell Mfg. Co., £533.

Vera Cruz Telephone Construction Syndicate, Ltd.—Particulars of claims by June 12th to the liquidator, Mr. C. C. Baker, Spencer House, South Place, E.C.

Modern Radio, Ltd.—Meeting June 8th, at 7, Bond Place, Leeds, to receive an account of the winding-up by the liquidator, Mr. A. Walton.

Lewis G. Lewis, Ltd.—Meeting June 7th, at 11, Pancras Lane, E.C., to receive an account of the winding-up by the liquidator, Mr. A. C. Hutchins.

S. F. Wilkinson & Co., Ltd.—Meeting June 6th at 24-26, North John Street, Liverpool, to receive an account of the winding-up by the liquidator, Mr. H. Cook.

Electricity Supply

Lighting, Domestic, Power

Accrington.—TRANSFORMERS.—The Electricity Committee is applying for sanction to the borrowing of £10,000 for transformers.

Argentina.—ELECTRICITY SUPPLY PROGRESS.—Despite the general industrial depression, electricity supply undertakings in Argentina made steady progress during the past year. Large increases in sales of electricity are reported by the Société de l'Electricité de Buenos Aires, the Compania Argentina de Electricidad, the Compania de Electricidad de la Provincia de Buenos Aires, and the Société d'Electricité de Rosario, and the number of consumers show a steady advance. At the power station at the new port in Buenos Aires work is in hand on the installation of a fourth turbo-generator set of 52,500-kW capacity and two new boilers which are expected to be ready for operation by the end of the current year. An underground h.p. line about thirty-one miles long has recently been laid to provide a connection between the power stations in Buenos Aires and La Plata.

Australia.—NYMBOIDA SUPPLIES.—According to the Brisbane *Daily Mail*, delegates from the Lismore, Casino, and Murwillumbah Municipal Councils and the Terania and Tweed Shires and the Clarence River County Council recently held a conference to consider a proposal to form a greater county council for the control of the hydro-electricity supply from the Nymboida plant throughout the North Coast districts. Nothing definite can, however, be done until the proposal has been referred to the constituent councils of the Clarence River County Councils.

Barking.—EXTENSIONS.—The Town Council has applied for sanction to a loan of £2,166 for giving a supply of electricity to Block Batteries, Ltd., and Austins (East Ham), Ltd., and for the provision of two sub-stations.

Birkenhead.—LOANS SANCTIONED.—The Electricity Committee has obtained sanction to the borrowing of £20,000 for unspecified mains and services, and £1,200 in respect of the Cleveland Street sub-station.

THE ASSISTED-WIRING SCHEME.—The Town Council has referred back for further consideration a resolution recommending that future installations under the assisted-wiring scheme shall be made only in those houses where tenants agree to use 120 kWh per annum and that in cases where the tenant fails to consume this amount he shall be required to pay 1d. per kWh not consumed.

Blackburn.—FACTORY SUPPLY.—Terms have been arranged between the Electricity Committee and Messrs. Joshua Hoyle & Sons, Victoria Mills, Rishton, for a supply of electricity at special rates.

Blyth.—SUPPLY TO COUNCIL HOUSES.—The North Eastern Electric Supply Co., Ltd., has submitted terms to the Town Council for supplying electric lighting to new Council houses, and the borough engineer is to prepare a report on the cost and other details.

Boston.—CHEAPER ELECTRICITY.—The Boston & District Electric Supply Co., Ltd., has reduced the "unit" charge of the all-in tariff to 1d.

Bristol.—FLOODLIGHTING SCHEME.—To celebrate a "trade treaty" by which Brighton has undertaken this year to buy from Bristol and Bristol to holiday in Brighton, a special floodlighting scheme embracing most of the city's principal buildings and gardens is to be arranged from June 17th to 24th. Brighton will return the compliment in September, when a "Bristol Week" will be held.

Cardiff.—SUB-STATION EQUIPMENT.—The Electricity Committee has approved an estimate of £1,855 for the construction and equipment of Milton Street sub-station. A new feeder and switchgear are also to be installed at Roath Park sub-station at an estimated cost of £2,390.

Colchester.—RESULT OF INQUIRY.—The Minister of Transport has given his consent to the erection of l.p. overhead lines in the urban district of West Mersea, but he is reserving power to review the situation at any time after the expiration of three years. The matter was recently the subject of a public inquiry.

Corby.—SUPPLY AVAILABLE.—An electricity supply is now available in Corby. The Kettering Electricity Department is responsible for the supply, and work is now in progress for extending the scheme to Weldon.

Dewsbury.—STREET LIGHTING.—The Corporation is considering the street lighting of Raventhorpe, and has asked for tenders from the Mirfield Gas Co. and the Electricity Department.

CINEMA SUPPLIES.—Electricity for cinemas is to be charged for at 2d. per kWh, subject to a minimum consumption of 100,000 kWh per annum.

Dunkeld and Birnam.—SUPPLY DELAYS.—In connection with complaints regarding the delay in providing electric lighting for Dunkeld and Birnam, Perthshire, the Highland District Council has received a letter from the Grampian Electricity Supply Co., Ltd., explaining that this has been due to wayleave difficulties. The Duke of Atholl, who presided, undertook to see Mr. George Balfour to ascertain the exact position, and

said that he hoped a supply would be available by next winter.

Eccles.—SUPPLY IN WORSLEY.—It was reported at a recent meeting of the Electricity Committee that the electricity supply Order of the Worsley Urban District Council had been transferred to the Lancashire Electric Power Co. by deed, but the U.D.C. was entitled to the re-transfer of its powers, as electricity undertaker, at stated intervals, and subject to the conditions set forth in the deed. In this connection, the town clerk submitted correspondence with the Lancashire Electric Power Co. regarding the Town Council's proposal for the transfer to the Eccles Corporation's area of supply of the added area of Worsley, stating that the question would be considered by the company's board.

SUB-STATION EXTENSIONS.—The Electricity Committee is to carry out sub-station extensions, &c., at a cost of £2,821.

Elgin.—STREET LIGHTING.—The Elgin Electric Supply Co.'s offer to install electric lighting in Moss Street has been accepted, and the Town Council has also agreed to light part of the High Street by electricity.

Elham.—OVERHEAD LINES.—The Kent Electric Power Co. is to erect an overhead distribution system to Lyminge and Etchinghill.

Farnborough.—OVERHEAD LINE INQUIRY.—A Ministry of Transport inquiry was held on May 3rd into the application of the Mid-southern District Utility Co. for permission to place an overhead line in Prospect Road.

Faversham.—LOAN SANCTIONED.—The Town Council has received sanction to a loan of £8,819 for the bulk supply arrangements, overspent capital, and mains extensions.

Flamborough.—DISTRIBUTION SCHEME.—The Buckrose Light & Fuel Co. has informed the Bridlington Rural District Council that it is preparing the specification for the l.p. distribution mains in Flamborough and district, and asks whether the Council is likely to proceed with public lighting by electricity. The latter matter has been referred to the Parish Council for consideration.

Gloucester.—NO SUPPLY FOR TWIGWORTH.—As a result of a canvass, the City Council has decided not to give a supply of electricity to Twigworth and neighbourhood.

Gravesend.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains in Parrock Avenue at a cost of £400.

High Wycombe.—COUNCIL HOUSE INSTALLATIONS.—The Town Council has arranged with the Wycombe (Borough) Electric Light & Power Co., Ltd., to install electric lighting at certain Council houses at Wycombe Marsh provided the cost of the wiring is borne by the company.

Hinckley.—ELECTRICITY CHARGES.—A sub-committee of the Rural District Council has met the Leicestershire and Warwickshire Electric Power Co. regarding the disparity in power charges in the rural area and Leicester, which are said to be from 36 to 70 per cent. more. Another tariff scheme is to be put into operation, but the Committee fears that in certain cases an increase—and not a reduction—will result.

Holland.—A GRID PROPOSAL.—The construction of a new generating station costing 12,000,000 florins at Nijmegen is contemplated by the Prov. Geldersche Electriciteits Maatschappij. In connection with this matter, the commission appointed by the Provincial State of Gelderland has recommended the establishment of an e.h.p. network covering the whole country.

Hull.—ELECTRICITY DEPARTMENT'S PROGRESS.—During the year ended March 31st 152,264,000 kWh was generated, an increase for the year of just over 10 per cent., while new connections numbered 9,082.

Ilfracombe.—ELECTRICITY CHARGES.—At a recent meeting of the Urban District Council it was reported that the clerk (Capt. H. G. Brede) had recently interviewed Sir John Brooke, vice-chairman of the Electricity Commission, and had discussed with him the suggestion that the Council should acquire the local electricity undertaking, and also the assertion that the electricity charges were excessive. The General Purposes Committee recommended that as a preliminary step, and before deciding to make any formal application for a price inquiry, the clerk should submit a full statement to the Electricity Commissioners in respect of charges for electricity and meters.

Inverness.—ASYLUM INSTALLATION PROPOSAL.—The Public Health Committee of the County Council has recommended that generating plant for a supply of electricity should be installed at the Asylum, in preference to taking a supply from the Inverness Town Council.

Ipswich.—ELECTRICITY FOR FELIXSTOWE.—The Electricity Committee is to lay mains, &c., in order to provide a direct supply to the Felixstowe Urban District Council, the cost being estimated at £8,470.

Luton.—LOANS.—The Town Council has applied for sanction to loans of £37,072 for the extension of transmission lines to Flitton, Greenfield, Pulloxhill, and other places in the rural area, and of £4,000 for grit-arresting apparatus for boilers at the electricity works.

E.A.W. members at the Witton works, inspecting the rotor of a 7,500 kVA alternator for the Jordan scheme

Maidenhead.—MAINS AND SERVICES.—The Town Council has applied for sanction to a loan of £6,000 for mains and services.

Malvern.—MAINS EXTENSIONS.—The Urban District Council has decided to extend mains to the Wyche Cutting at an estimated cost of £400.

Maryport.—SUPPLY INAUGURATED.—The ceremony of switching on the electricity supply provided by the Mid-Cumberland Electricity Co., Ltd., was performed on April 29th by Mr. J. H. Rich, chairman of the Urban District Council. The lighting flat rate is 7d. per kWh.

Motherwell and Wishaw.—NEW SUB-STATIONS.—The Town Council is to erect a 500-kW automatic sub-station in place of the present 100-kW sub-station at Jerviston to meet the needs of the Corporation's tenants there. The burgh electrical engineer has also been instructed to negotiate for a suitable site for the erection of a sub-station and rotary convertor installation with automatic control at an estimated cost of £4,330.

MAINS EXTENSIONS.—An expenditure of £2,774 in connection with the laying of mains, &c., for Corporation houses at Braidhurst has been approved.

Newmarket.—SPECIAL ORDER.—The Newmarket Electric Light Co., Ltd., has applied to the Electricity Commissioners for a Special Order authorising it to supply electricity in the whole of the Newmarket urban district.

Northumberland.—SCHOOL LIGHTING.—The County Council is to install electric lighting in the following schools: Earsdon (£56); East Chevington (£235); and the Seaton Delaval Old Council School (£75).

Northwood.—REDUCED CHARGES.—The Northwood Electric Light & Power Co. and the Colne Valley Electric Supply Co., Ltd., have reduced their lighting flat rate from 6½d. to 6d. per kWh, and the power rate from 2d. to 1½d. The fixed charge of the two-part tariff has been reduced, and the "unit" charge is to be ½d. lower in the summer, the winter charge remaining at 1d. The tariff for business premises has also been lowered.

Plymouth.—FREE WIRING.—The City Council has received sanction to a loan of £10,000 in connection with its free-wiring scheme.

Preston.—THE ANNUAL INSPECTION.—Speaking at a luncheon which followed the annual inspection of the Ribble power station by members of the Preston Corporation, Councillor Rhodes (chairman of the Electricity Committee) quoted figures showing how the undertaking had expanded until to-day it had a total invested capital of £2,263,000, employed 600 men, and had 90 miles of overhead and 355 miles of underground mains. Last year the electricity generated had increased by 10 million kWh, making a total of 110 million kWh, and this

Municipal Supply Undertakings' Results

Town.	Engineer.	Revenue. 1930/31.	Revenue. 1931/32.	Working Expenditure. 1930/31.	Working Expenditure. 1931/32.	Net Profit. 1930/31.	Net Profit. 1931/32.	Sales of Electricity. 1930/31.	Sales of Electricity. 1931/32.
		£	£	£	£	£	£	kWh.	kWh.
Birkenhead	F. E. Spencer	217,811	243,284	142,652	147,135	4,754	13,366	28,936,266	36,665,390
Eccles	H. W. Angus	50,840	51,709	36,175	33,973	4,481	7,524	8,074,208	8,193,405
Inverness	G. C. McLean	29,902	27,989	16,112	10,571	2,670	2,644	1,911,720	1,917,619
Long Eaton	J. H. Hammond	33,308	34,673	22,553	24,626	3,384	1,565	3,656,025	4,180,279
Tynemouth	C. Turnbull	69,116	65,417	61,163	60,652	5,859	2,632	8,310,787	8,200,221
Wimbledon	A. E. McKenzie	217,329	225,201	108,544	121,041	32,389	22,494	30,143,349	33,329,843

year the output showed an advance of 22 million kWh, bringing the total to 132 million kWh. This year revenue would be £354,000, as against £228,000 last year, while working expenses would be £163,000 as against £148,000. The gross surplus was £191,000, as against £180,000.

Rawtenstall.—YEAR'S WORKING.—The electricity undertaking last year made a profit of £3,278, out of which £1,000 has been allocated to the relief of rates. Mr. J. E. Shepherd, the electrical engineer, states that the abandonment of tramways represented a decrease in profit of £4,450, and the cotton strike reduced the sales of the undertaking by 350,000 kWh. A record number of consumers was connected, however, many through the assisted-wiring scheme.

Redcar.—PROMENADE ILLUMINATIONS.—A scheme is being prepared for earlier and extended illuminations on the promenade.

Reigate.—HIRE CHARGES.—The Town Council has decided to hire out cookers at the following quarterly rentals: Suitable for households up to four persons, 7s.; up to seven persons, 8s.; up to ten persons, 9s. 6d.; the charges are to include wiring up to 30ft. from the meter, the installation and maintenance. Kettles are to be hired out at 1s. per quarter where cookers are installed, and at 1s. 6d. otherwise. The electrical engineer is to meet the local contractors in an endeavour to arrange with them for wiring the cookers at the schedule rate fixed, the work to include only the cable and fixing, the Council being responsible for supplying the double-pole main switch and fuses, and the cooker control unit.

Richmond (Yorkshire).—PROTEST AGAINST ELECTRICITY CHARGES.—The North Eastern Electric Supply Co., Ltd., is to be approached by the Rural District Council on the matter of alleged exorbitant prices for electricity in rural areas. At a recent meeting of the Council, Councillor Norris stated that in the surrounding villages 8d. per kWh was charged for electric lighting, while in Darlington they were paying ½d. He moved that the company should be requested to explain why they "should pay sixteen times as much for electricity as the Darlington consumers." The Council is to act on this suggestion.

Russia.—WATER-POWER DEVELOPMENT.—About one-tenth of the water-power resources of the Soviet Union is concentrated in the Tadzhik Republic. It is now planned to utilise part of this power by building a hydro-electric power station on the Vakhshah River. The new iron and steel works which are to use the large reserves of iron ore of the republic will be the chief consumers of the power generated. We learn also from a Russian source that designs have been completed by the Commissariat for Heavy Industry for the building of a second hydro-electric power station on the Rion River in Georgia. The station is to have a capacity of 54,000 kW, and is to be finished in two years. It will be situated above the present Rion Dam, and, unlike the first station, will have a water reservoir which will make it possible to maintain a uniform output of power throughout the year. The dam will be 60 metres in height.

Sheffield.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £2,500.

Shipley.—CABLE EXTENSION.—The Electricity Committee has approved the laying of a l.p. interlinking cable from Northcliff sub-station to the Branch, at a cost of £290.

TENDERS FOR CABLES.—Tenders are to be invited for cables required during the next twelve months.

Singleton.—A SUPPLY SHORTLY.—It is hoped to supply Singleton-in-the-Fylde with electricity in about two months' time. The laying of cables to Weeton and Westby districts has not yet commenced.

Sleaford.—ASSISTED-WIRING AND HIRE-PURCHASE SCHEMES.—The Electricity Committee is to consider methods of developing the undertaking by means of assisted-wiring and the hire-purchase of cookers.

South Africa.—REDUCED TARIFF AT JOHANNESBURG.—The Johannesburg City Council has approved reductions in electricity charges involving a direct saving of £40,000 a year to consumers.

THE LICHTENBURG SCHEME.—Mr. Val Davies, the consulting engineer, has discussed with the Lichtenburg Town Council the possibility of reducing the cost of the electricity scheme, which he had estimated at £22,274. He said that the expenditure could be reduced to £16,000 by cutting out part of the distribution system. He had provided for a network of 15 miles.

South Shields.—THE ASSISTED-WIRING SCHEME.—The electrical engineer recommends the borrowing of £3,000 for the assisted-wiring scheme.

SUPPLY TO SUTTON ESTATE.—The question of supplying electricity to the Sutton Estate, Whitburn, where 366 houses are now being built by private enterprise, is being discussed by the Town Council and the North-Eastern Electric Supply Co., Ltd.

Stewartry.—PROGRAMME OF DEVELOPMENT.—The County Council has considered the report of the Electricity Committee on the programme for the first year of the Stewartry electricity undertaking and has approved a proposal to spend £61,000, including the cost of the works already undertaken in the burgh and parish of Kirkcudbright. A special sub-committee is to initiate a programme for proceeding with the general distribution scheme. It has been agreed that, before making an offer to take over the Dalry Electric Supply Co., a valuation of the whole of the works at Dalry should be made. The consulting engineer has been instructed to proceed at once with the following urgent works: General extension of the distribution system in the vicinity of Kirkcudbright, including the proposed line to St. Mary's Isle and Twynholm; linking up the burgh of Castle-Douglas with the Galloway Water Power Co.'s line from Tongland to Glenlochar; the maintenance of a supply of electricity for Dalbeattie, Gatehouse, Castle-Douglas, Dalry, and New Galloway; the provision of a distribution line leading from Castle-Douglas to Dalbeattie; and the provision of a supply of electricity for the Minnigaff district. The Council has agreed to take over the undertaking of the Castle-Douglas Electric Light Co. as soon as a supply of electricity can be made available and meantime the expansion of the present system is to be proceeded with. With regard to the agreement with the Dalbeattie Electric Light & Power Co., Ltd., it has been arranged for Mr. Hugh Brown, the present manager of the company, to continue to act in that capacity on behalf of the Council until October 1st next.

Stockport.—ELECTRIC COOKING DECISION.—Divided opinions on which was the best method of cooking—by gas or electricity—were expressed at the May meeting of the Town Council. The vice-chairman of the Gas Committee criticised the decision of the General Purposes Committee to accede to a request from a builder that the streets on a housing estate to be developed at Kay's Field, Turncroft Lane, should be lighted by electricity, as no gas fittings would be provided in the 138 houses that were to be built. The Gas Committee, he said, regarded the decision as showing an unfair attitude towards the gas undertaking. No gas main would be laid, and this meant that if the occupants of the houses ever wanted gas in their houses the Gas Committee would be faced with the cost of disturbing the roads in order to lay a main. Councillor J. Morton said if the builder was building the houses for sale without gas the responsibility was his. The tenants would be going into the houses with the knowledge that there was no gas. The decision of the General Purposes Committee was confirmed.

Sunderland.—MAINS EXTENSIONS.—Extensions to electricity mains costing £939 in connection with a new sub-station to be erected by the River Wear Commissioners are to be carried out by the Town Council.

Ticehurst.—OVERHEAD LINES.—The Weald Electricity Supply Co., Ltd., is to erect overhead lines at Silverhill, Hurst Green.

Torquay.—MAINS AND SERVICES.—The Electricity Committee is to apply for sanction to the borrowing of £20,000 for mains and services.

INSTALLATION WORK.—The Highways Committee has decided to install electricity in the Corporation Buildings, Market Street, at a cost of £200.

Turkey.—SUPPLY DURING 1932.—According to a report of the Société Turque d'Electricité, of Constantinople, the output of power stations during 1932 amounted to 87,780,300 kWh, as compared with 84,703,400 kWh in the preceding year, the number of consumers increasing from 73,079 to 78,835.

Tynemouth.—ANOTHER CONCESSION.—The Town Council has granted an application from flat-rate consumers (public houses and works) to be supplied on the same lines as shopkeepers, whereby electricity is charged for at 2d. per kWh after 200 hours' use per quarter.

SUPPLY TO PLAZA.—Electricity is to be supplied to the Plaza at a cost of £1,000.

Ulverston.—PRICE REDUCTIONS.—The following reductions have been made in electricity charges: Lighting flat rate, from 7d. to 6d. per kWh. For premises other than dwelling houses, demand rate, 1½d. per kWh for the first 100 kWh, in place of 240 kWh, and 1d. per kWh beyond. Private house supplies: Heating, cooking and water heating, first 100 kWh (instead of 240 kWh), 1d.; beyond ¾d. The rates for motive power, shop lighting, &c., remain unchanged.

United States.—THE MUSCLE SHOALS SCHEME.—The Senate has passed the Bill for the implementing of the Muscle Shoals hydro-electric project as part of the scheme for the development of the Tennessee Valley.—*Reuter* (Washington).

Wakefield.—MINIMUM CHARGES.—The Electricity Committee has decided to charge a minimum of 6s. 6d. a quarter for supplies of electricity under the rateable-value tariff.

LOAN FOR CABLES.—Sanction is to be sought to a loan of £8,000 for cables.

Walsall.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £950 to supply electricity to eighty-nine Council houses on the Proffitt Street site.

Warrington.—SUPPLY TO HIGH LEGH.—The Town Council has received sanction to the borrowing of £1,350 for overhead lines in connection with the supply to High Legh.

Westmorland.—ELECTRICITY SCHEME.—The Westmorland District Electricity Supply Co. is about to carry out a scheme for the supply of electricity from Kendal to Arnside, Carnforth, Kirkby Lonsdale, Lupton, Crooklands, and Endmoor. The charges will be 8d. per kWh for lighting, and 2d. for domestic power, with an alternative tariff comprising a rateable-value charge, plus 1d. per kWh, and another rate of ½d. per kWh for water heating between 10 p.m. and 7.30 a.m.

Traction

Australia.—SYDNEY ELECTRIC RAILWAY.—An Australian newspaper states that the most recent estimate of the cost of an electric railway from North Sydney to Newport is £4,700,000. If the line commenced at St. Leonards the cost would be £4,000,000. English investors have offered to construct the railway, and further information on the subject was sought recently by the New South Wales State Government.

Blackpool.—FUTURE OF THE TRANSPORT DEPARTMENT.—The much-debated report of Mr. W. Luff, Blackpool's new transport manager, in which he makes drastic recommendations regarding future administration of the Transport Department, is as far-reaching as was prophesied. On Mr. Luff's suggestion, the Committee has decided to cancel all free passes on trams and buses except in special instances; the number affected reaches nearly 1,000. Mr. Luff reports that "in the past the winter staff does not appear to have been deflated sufficiently, consequent, to some extent, on the multiplicity of depôts and the scattered nature of internal organisation." He recommends revision of the Rigby Road depôt to remedy this defect, stating that for an output of 100 buses, &c., per day the total staff should not exceed 700. He also advocates the purchase of twelve new double-deck buses with new tramcars to replace the box-type slow-moving cars on the Fleetwood and Bispham sections. Permanent-way maintenance should be placed in the hands of the Transport Department, as in other towns, and an excess third-party policy taken out. The central transport fleet should be remodelled and certain new vehicles obtained, and the question of motor cars for official use should be reconsidered. The inclusion in the next Parliamentary Bill is also recommended of an application for omnibus or trolley-bus powers in lieu of trams so that the powers may be used when necessary. In addition to abolishing free passes, the manager advocates a reduction and limitation of workpeople's certificates and the discontinuance of discount tickets, the charge for contract tickets to be reconsidered with a view to an upward revision.

A glimpse inside the new signal box at King's Cross Station, London, showing some of the 232 levers and the illuminated chart on which the movements of each engine and train are indicated

Darlington.—TENDERS FOR TROLLEY-BUSES.—The Gas and Electricity Committee is to invite tenders for the supply of additional trolley-buses.

France.—RAILWAY ELECTRIFICATION.—The authorities of the Department of the Seine have recently authorised the raising of a loan of about £1,400,000 for the electrification of the railway between Paris and Sceaux. The line has lately been taken over from the Orleans Railway Co. by the Department, and is to be linked up with the Paris underground railway.

Halifax.—REJECTION OF PURCHASE OFFERS.—The Council has decided not to entertain any offer for the purchase of the tramway system and the motor-buses.

Japan.—ELECTRIFICATION SCHEMES.—Estimates have been prepared for the I.G.R.'s proposed railway electrification schemes for the year 1933-34. A sum of 1,803,033 yen is to be spent on the Kodzu-Numadzu section of the Tokaido line, and transmission lines will be erected between Yugawara and Mishima and between Atami and Numadzu, with substations at Mishima and Yugawara. On the Iida-machi-Chiba section 909,600 yen will be expended, and other lines to be electrified are the Uyeno-Senju, Shinagawa-Tsurumi, Kofu-Nirashima, and Haramachida-Hachiojo sections, for all of which, however, the appropriations for the year are comparatively small.

Liverpool.—ALL-DAY TICKETS.—As an experiment, sixpenny all-day tickets (10 a.m. to midnight) are to be issued on the trams during June, July, and August.

INCREASED SPEEDS SANCTIONED.—Increased speeds for trams and fewer compulsory stops have been sanctioned by the Minister of Transport.

London.—TRAFFIC SIGNALS FOR PICCADILLY.—Vehicle-actuated traffic signals are now being installed in Piccadilly and many other parts of London.

TRAM SPEED-UP PROPOSAL.—A proposal that London County Council trams should travel at a general speed of 20 miles an hour is made by Colonel A. C. Trench, Ministry of Transport Inspector, who has carried out an inspection of the Western and Southern areas, following an application by the L.C.C. for a general increase of the prescribed maximum speeds, and a revision of the existing compulsory stopping places. On a few specified lengths, it is suggested, the speed may be 25 m.p.h., and, possibly, on one or two lengths 30 m.p.h. The present general speed for L.C.C. trams is 16 miles an hour, with only one or two portions of route where 20 miles an hour is authorised.

Sunderland.—TRAFFIC SIGNALS.—The Town Council is to erect one-way automatic traffic signals, at a cost of £120, at several road junctions.

Communications

Australia.—RADIO-TELEGRAPH AGREEMENTS.—The Federal Ministry is expected shortly to review the terms of the agreements at present in force between the Commonwealth Government and Amalgamated Wireless (Australasia), Ltd., under which overseas radio-telegraph services are conducted.

RESTRICTION ON SALE OF NEW TELEPHONES.—The Postmaster-General's Department has withdrawn its permission to telephone subscribers to purchase from private firms new combination hand telephone instruments. They now have to be obtained through the Postal Department, the charges being 30s. on application and after three years 10s. a year. The reason is that there are still 80,000 telephones of the older type in stock, and it is desired to use these up before the new type comes into general use.

Belfast.—NEW B.B.C. STATION.—The B.B.C. is seeking a suitable site on which to erect a new broadcasting station. Special attention has been given to the Craigartlet locality, about five miles from the city, an elevated position in the Castlereagh range of hills to the north-east of Belfast.

Great Britain.—RADIO RELAY EXCHANGES.—The Sheffield City Council is considering a local firm's application for permission to erect wires across public thoroughfares for radio relay services.

The Barrow-in-Furness Corporation Highways Committee's agreement with Rediffusion, Ltd., permits wires to cross each front street once, but applications to cross any front street more than once will be considered by the Committee on their merits.

The Edinburgh Corporation has recommitted a sub-committee's recommendation that permission to carry overhead wires over public streets should be refused. It was pointed out that a similar relay system in Hull was supplying 120,000 people with radio programmes. Two hundred men were employed on the service, and between £4,000 and £5,000 of revenue had accrued to the city authorities.

The Enfield U.D.C. Highways Committee has communicated with the Middlesex County Council in support of an application of Rediffusion, Ltd., for a licence to place wires across county highways.

The Margate Town Council has granted Rediffusion, Ltd., permission to establish a service in the borough. The agreement is for five years.

The Ayrshire County Council has referred to the Highways Committee an application from Ayrshire Wireless Service, Ltd., for permission to establish services at various towns.

Japan.—NEW RADIO STATION.—The Japanese Government has decided to erect a 100-kW wireless station at Kurume City. The cost is estimated at £100,000.

Manchester.—WIRELESS FOR AIR-TAXIS.—The first air-taxi operated by Airwork, Ltd., from Barton Moss is to be equipped with a new type of Marconi light-weight apparatus, which will enable the pilot to keep in touch with the new wireless station at the airport, or with other ground stations in Great Britain and the Continent when long-distance flights are undertaken. The Type A.D.6N equipment incorporates a transmitter and receiver in a single instrument box of small dimensions, and derives its power from a wind-driven generator mounted in the slipstream from the propellor of the aircraft. The same generator can be used, if required, to supply current for the general lighting of the machine. Little tuning is required, and the apparatus can therefore be installed in any convenient part of the aircraft and operated from the pilot's cockpit by means of remote control.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Argentina.—BUENOS AIRES.—June 19th. Ministry of Public Works. Hydro-electric plant, including turbo-generators, Diesel-electric generators, transformers, switchboards, accessories, spares and tools. (A.X. 11767.)*

Australia.—SYDNEY.—May 29th. Municipal Council. 50-kV pin and strain type insulators. Constructional Engineer's Office, Electricity Department, St. Andrew's Place, Sydney (deposit £1).

June 6th. Current differential transformers. Constructional Engineer's Office, Electricity Department (preliminary deposit £30).

MELBOURNE.—May 30th. Posts and Telegraphs Department. Rubber-insulated telephone wire (A.X. 11778)* and cordless telephone switchboards (A.X. 11779)*.

Ayr.—May 20th. County Council. Various works, including electrical, in connection with erection of houses at Crosshouse. Mr. W. Reid, county architect, Ayr.

Barking.—May 23rd. Electricity Department. 6,600-V switchgear. (See this issue.)

Bath.—May 31st. Electricity Department. Meters and h.p. and l.p. cables. (May 5th.)

Cleethorpes.—May 22nd. Electricity Department. Sub-station equipment. (April 28th.)

Denbighshire.—May 24th. County Council. Erection of generators and switchboard. (See this issue.)

Dover.—June 2nd. Electricity Department. Transformers. (See this issue.)

Egypt.—CAIRO.—June 27th. Ministry of the Interior. Electrical distribution network to supply Samallout and Maassaret Samallout. (A.X. 11780).*

June 15th. Ministry of Education. Diesel generating set. (A.X. 11783.)*

Epsom.—May 15th. Electricity Department. 1,000-kW rotary convertor equipment. (May 5th.)

Halifax.—May 31st. Health Committee. Boiler-house plant for laundry at Isolation Hospital, Northowram Hall. (See this issue.)

Hastings.—June 3rd. Electricity Department. Boiler fuel. (See this issue.)

Irlam.—May 15th. Urban District Council. Street lighting poles. (April 28th.)

Kirkcudbright.—May 17th. County Council. 11-kV overhead and underground distribution lines. (April 21st.)

May 31st. Transformers. (See this issue.)

London.—OFFICE OF WORKS.—May 16th. Lamps. (May 5th.)

ISLINGTON.—May 31st. Electricity Department. Oil-purifying equipment. (See this issue.)

KENSINGTON.—May 17th. Borough Council. Vehicle-actuated traffic signals at the junction of Ladbroke Grove and Lancaster Road. Borough engineer and surveyor, Town Hall.

Manchester.—May 15th. Highways Department. Vehicle-actuated traffic-control installations at Oldham Road and Varley Street, and at Oldham Road and Dean Lane, Newton Heath. Surveyor, Highways Department, Town Hall.

Menston (near Leeds).—May 15th. Installation of electric lighting at Mental Hospital. Mr. E. H. Burton, architect, Board offices, Wakefield.

Paisley.—May 15th. Corporation. Various works, including electric lighting, for Newton Street housing scheme. Master of works, 16, Gilmour Street.

May 17th. Various works, including electric lighting, at nurses' home, Barshaw Maternity Hospital. Master of works, 16, Gilmour Street.

Peterhead.—Installation of electric lighting at the West Associate Church. Mr. J. McG. Wright, Seafield, Peterhead.

Portugal.—June 24th. Department of Posts, Telegraphs and Telephones. Supply and installation of a short-wave broadcasting station. Administraçao Geral dos Correios, Telegrafos e Telefones, 3a, Divisao da Direccao dos Serviços de Exploraçao Electrica.

Rosslynlee.—May 20th. Midlothian and Peebles Asylum Board. Rewiring of Asylum and installation of new ventilating fans. (May 5th.)

Sandy.—Parochial Church Council. Installation of electric lighting at church.

Shipley.—May 16th. Electricity Department. Paper insulated cables. (May 5th.)

South Africa.—PRETORIA.—May 19th. Government Supplies Board. Telephone terminal blocks and outdoor distribution boxes (A.X. 11775)*. and pole bases, lightning rods, screw rings, tape, &c. (G.X. 12516)*.

June 2nd. 6,000 sac-type elements for Leclanché cells (A.X. 11786)* and fifteen motor-driven magneto generators (A.X. 11785.)*

JOHANNESBURG.—May 20th. City Council. Sixty miles of twin-, three- and four-core 660- and 6,600-V cable. (A.X. 11784.)*

Southern Rhodesia.—SALISBURY.—June 6th. Municipal Council. Turbo-alternators, switchgear, cable, and transformers. (A.X. 11771.)*

West Hartlepool.—May 23rd. Electricity Department. H.p. and l.p. cables. (See this issue.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Accrington.—Education Committee. Accepted. Electrical installation at Grammar School.—A. E. Dent.

Barrow-in-Furness.—Electricity Committee. Accepted. Supplies for 12 months. Copper wire.—Thos. Bolton & Sons, Ltd. Tapes, switch cut-outs, cables, &c.—British Insulated Cables, Ltd. Switches, plugs, &c.—W. R. Thornton, Ltd. Meters.—Landis & Gyr, Ltd.; Metropolitan-Vickers Electrical Co., Ltd. Insulators.—Electric Transmission, Ltd. Four-core and twin cables.—Derby Cables, Ltd. Kettles.—Bulpitt & Son, Ltd.; Premier Electric Heaters, Ltd. Cookers.—L. G. Hawkins & Co., Ltd. Cooker control units.—Simplex Electric Co., Ltd.

Blackpool.—Electricity Committee. Accepted. Meters for twelve months.—Ferranti, Ltd.; Aron Electricity Meter, Ltd.; British Electric Meters, Ltd.; Chamberlain & Hookham, Ltd.; Landis & Gyr, Ltd.; Metropolitan-Vickers Electrical Co., Ltd.

Bradford.—Health Committee. Recommended. Plant for St. Luke's Hospital.—Two "Scialytic" shadowless lamps (£130).—Technical Lighting & Equipment Co., Ltd. Sterilising equipment (£490).—Down Bros.

Carlisle.—Electricity Committee. Accepted. Cables for three years.—British Insulated Cables, Ltd.; Macintosh Cable Co., Ltd.; Metropolitan Electric Cable and Construction Co., Ltd. Transformers for two years.—Brush Electrical Engineering Co., Ltd.; British Thomson-Houston Co., Ltd.; Johnson & Phillips, Ltd.

East Ham.—Electricity Committee. Accepted. Two 500-kVA transformers.—English Electric Co., Ltd.

Gloucester.—City Council. Accepted. 6,000-kW transformer (£1,780).—Ferranti, Ltd.

Gravesend.—Electricity Committee. Recommended. Two kiosks (£301).—Crompton Parkinson, Ltd.

Hull.—Electricity Committee. Accepted. Static transformers.—Metropolitan-Vickers Electrical Co., Ltd.; Yorkshire Electric Transformer Co., Ltd. Street lighting brackets (£1 1s. 2d. each).—Wardle Engineering Co., Ltd. Posts (£2 19s. each).—Revo Electric Co., Ltd. Time switches (£1 19s. 9d. each).—Horstmann Gear Co., Ltd.

Telephones Committee. Accepted. 200 bell sets (£136).—Automatic Electric Co., Ltd.

Lanarkshire.—County Council. Accepted. Electric lighting work at thirty houses at Chapelhall (£138).—D. Henderson.

Leeds.—Electricity Committee. Accepted. Sub-station kiosks for twelve months (£210 5s. each for sectionalised and £153 each for single).—Yorkshire Switchgear & Engineering Co., Ltd. Switchgear for Moor Allerton sub-station (£599).—English Electric Co., Ltd. Cables.—W. T. Henley's Telegraph Works Co., Ltd. (£468); Enfield Cable Works, Ltd. (£294); Macintosh Cable Co., Ltd. (£455); Edison Swan Cables, Ltd. (£1,052); Hackbridge Cable Co., Ltd. (£808); Metropolitan Electric Cable & Construction Co., Ltd. (£729).

Liverpool.—Water Committee. Accepted. Hydraulic turbo-driven electric generator at Oswestry filter beds (£753).—Gilbert Gilkes & Gordon, Ltd.

London. — HACKNEY. — Works Committee. Recommended. Electric vehicle (£615).—Electricars, Ltd.

HACKNEY.—Works Committee. Recommended. Electric vehicle (£615).—Electricars, Ltd.

Manchester.—Electricity Committee. Accepted. Static transformers for twelve months.—Ferranti, Ltd.; Metropolitan-Vickers Electrical Co., Ltd. Circulator immersion type water heaters for six months.—George Bray, Ltd.; Archibald Low & Sons, Ltd.

Morecambe.—Electricity Committee. Accepted. Erection of overhead lines to Broadgate and Westgate building estates.—Craven & District Electrical Construction Co., Ltd.

Motherwell and Wishaw.—Town Council. Accepted. Installation of electric lighting at twenty-eight houses at Waterloo (£139).—Darroch & Espie.

Reigate.—Town Council. Accepted. Cookers.—General Electric Co., Ltd.

Rotherham.—Electricity Committee. Recommended. Transformers for 12 months.—General Electric Co., Ltd. Switchgear for 12 months.—A. Reyrolle & Co., Ltd.

Tynemouth.—Town Council. Accepted. Cable (£172).—Macintosh Cable Co., Ltd.

Forthcoming Events

Institution of Electrical Engineers (*Scottish Centre*).—Friday, May 12th. Foresters' Hall, Dundee. 7.30 p.m. Faraday Lecture. "Lightning—And How the Engineer Deals with its Effects." Prof. J. T. MacGregor-Morris. Saturday, May 13th. Excursion from Dundee to Pitlochry. (*Irish Centre* (*Dublin*)). Friday, May 19th. 1, Foster Place, College Green, Dublin. Annual general meeting.

British Science Guild.—Tuesday, May 16th. Carpenters' Hall, E.C.2. 4.30 p.m. "Metals in the Service of Human Life and Industry." Sir Harold Carpenter.

Royal Society.—Wednesday, May 17th. Burlington House, W. 8.30 p.m. Conversazione.

Overhead Lines Association.—Wednesday, May 17th. I.E.E., London. 5.30 p.m. "Some Problems of Applying Electricity to Agriculture." Mr. F. E. Rowland.

Birmingham Electric Club.—Friday, May 19th. Annual outing. Visit to the Hollinwood works of Messrs. Ferranti, Ltd.

Notes

Main-road Public Lighting

A paper recently communicated to the Institution of Civil Engineers by Mr. C. C. Kirby deals with the electric lighting of main roads in large cities. The factors which determine good illumination are discussed, and a large central suspension installation at Salford is described.

The type of equipment used and the results obtained are outlined, and a complete estimate is given of the capital and operating costs of a public lighting installation, based on 1,000 lamps of 500 W each on a 20-mile route, totalling £15 per lamp approximately.

The Institute of Welding

At a recent meeting of the Institute of Welding Engineers at Newcastle-on-Tyne it was agreed to form a North-East Coast branch of the society. Mr. A. E. Shorter, who presided, gave a short address explaining the objects of the society, and appealed for support from the district. Mr. Roberts, a member of the council, described the progress made in the Manchester area. Mr. Norman Hunter said that welding was making rapid progress in America and Germany, and it was said that Britain was lagging behind. He did not think this was true. They needed a branch on the North-East Coast, which was the centre of the heavy industries.

I.E.E. Golf Competition

The I.E.E. Mersey and North Wales (Liverpool) Centre's golf tournament in aid of the benevolent fund of the Institution will be held on May 24th on the links of the Royal Liverpool Golf Club at Hoylake. The various events, including the competition for the G. P. Dennis Trophy, are open to members of the I.E.E. and their friends. The prizes, given by a number of electrical manufacturers, will be presented after dinner the same evening.

Electricity from Charcoal

An interesting experiment was recently carried out by the Industries Department of the Mysore State in the erection of a gas plant for generating electric power from lantana charcoal. The experiment yielded satisfactory results, inasmuch as it was found possible to generate electric power at a cost of about one anna per kWh. The plant is stated to be well suited for lighting purposes in rural areas, which are not within reach of the hydro-electric system.

The Halley Stewart Laboratory

A new laboratory was formally opened at 30, Chesterford Gardens, Hampstead, on May 4th by Lord Rutherford. The lease of the premises, together with a substantial yearly grant towards the maintenance of the laboratory, constitutes a Sir Halley Stewart Trust benefaction to King's College, London, for research in the physical sciences and in particular for the

Lord Rutherford with Professor A. V. Appleton at the new laboratory

prosecution of Prof. A. V. Appleton's investigation of the electrical properties of the upper atmosphere in relation to short-wave radio transmission and reception. The transference of this work to an electrically quiet locality will avoid the disturbance caused by machinery which has hampered the experiments hitherto carried out in the college basement in the Strand.

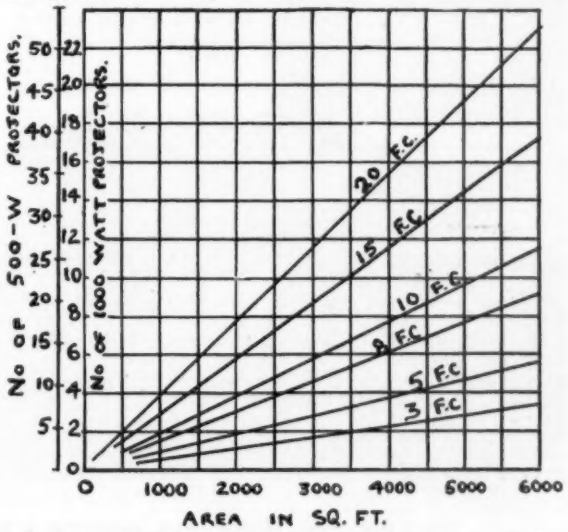
Electrical Plant on Ships

The Netherlands Court of Navigation has delivered judgment regarding the loss by fire of the motor liner *Pieter Corneliszoon Hooft* at Amsterdam on November 14th last. According to the *Journal of Commerce* it has not been possible to determine the cause of the outbreak. The Court has, however, taken the occasion to make the following recommendations in respect of electrical equipment on board ships:—

1. Unarmoured rubber wiring should not be fixed at the back of wooden bulkheads or partitions, but all wiring should preferably be fitted so as to be directly accessible and be enclosed in a lead covering and steel piping. 2. Greater care than has been usual in the past should be exercised in ensuring a better fit where wiring passes through bulkheads. 3. No fuses or safety elements of doubtful quality should be kept on board. 4. Where the ship's hull is used as an earth connection, both the lead covering and the steel piping, containing live wires, should be efficiently earthed to the hull. 5. It is desirable that investigations be made with the object of discovering a material for isolating the lead covering from the steel piping which, when heated, will not develop a combustible gas.

Rapid Floodlighting Calculations

The accompanying chart enables a rapid estimation of the number of 500- or 1,000-W floodlights required for the illumination of a given area at any specified intensity to be made, or provides a check on the final calculations. The number of floodlights given is approximate, as due allowance must be



made for portions of the buildings that do not intercept the beam, and in the case of irregular shaped buildings to provide sufficient overlap of the beams to ensure the specified degree of uniformity. The curves are based on a total of 26 per cent. of the lamp lumens being directed into the beam.

Educational

The Manchester Municipal College of Technology announces that applications from candidates for the Edmund Mills Harwood Memorial Scholarship must be received by June 15th.

(See our classified advertisements.)

A Disclaimer

Referring to our last week's note regarding the irregular use of electricity at Skipton, the Craven & District Electrical Construction Co., Ltd., has sent us a copy of a letter addressed to it by the clerk to the Skipton U.D.C., assuring the company that it was not one of the contractors who were alleged at the Council meeting to be involved in the matter.

The Wick Inquiry

Mr. H. Nimmo held an inquiry at Wick last week for the Electricity Commissioners into a controversy that has arisen regarding the manner in which electricity supply has been administered. Criticisms had been offered to the effect that the staffing, buildings, and machinery were excessive, that the accounts were vague, that sums which should have been charged to revenue were credited to capital account, and that the engineer was too young. Mr. L. R. Jones, C.A., who had audited the accounts since 1931, said that they were kept in accordance with the Electricity Commissioners' requirements, and he was satisfied that they were in order. Mr. Nimmo said that his finding would be reported in due course. The inquiry was held at the request of the Town Council "to restore public confidence in the undertaking."

Ferguson, Pailin Switchgear

With reference to our article on "Novel Switching Arrangements" published on April 21st, Messrs. Ferguson, Pailin inform us that they are also making vertical isolated metal-clad switchgear incorporating the special transfer arrangement described.

Appointments Vacant

Temporary junior mains assistant for Bromley Electricity Department.

Lady cooking demonstrator for Newport Electricity Department.

Meter tester and repairer and also meter fixer for Barking electricity undertaking.

Electrical engineer for Nigerian Government.

(See our classified advertisements.)

Makers' Names Wanted

PARAWAY iron.
PARAHEAT iron.
G wiring buckle clip.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Mr. F. L. Pedley, mains assistant, has been appointed acting electrical engineer by the Hazel Grove and Bramhall Urban District Council, pending the appointment of a successor to the late Mr. R. Lomax.

Mrs. Lomax has been granted an honorarium of £100 in recognition of the extra and special services rendered by her late husband in connection with the £20,000 mains scheme completed during the current year.

Mr. H. Lowe, traffic superintendent, has been recommended by the Transport Committee of the Barrow-in-Furness Corporation for the appointment of assistant transport manager at a salary of £275 per annum, rising to £300.

Mr. H. G. Horner has been appointed by the Australian Broadcasting Commission to control the northern zone, comprising New South Wales and Queensland, and **Mr. F. W. Bearup** to control the southern zone, comprising the remaining States. These appointments are made pending the appointment of a new general manager to succeed the late Mr. H. P. Williams.

The E.D.A. North Midland Area Committee at Leigh

Front row (left to right): Messrs. P. Hewitt (Sheffield), J. E. Fletcher (Halifax), W. Fennell (Mid-Cheshire), M. S. Mason (Worksop), A. J. Beckett (Bridlington), E. J. Nichols (York), T. Roles (Bradford, chairman), J. Bowyer (manager, Anchor Works). A. Smith (Bradford), E. J. Jarvis (Scarborough), E. A. Mills (Halifax), P. Maxwell (Batley), W. Angus (Dewsbury), G. Casperson (Leeds).

Mr. J. F. Simpson, electrical engineer to the Preston Corporation, has been elected president of the Preston Scientific Society with which he has been connected for nineteen years.

Mr. W. Riggs has been appointed by the Electrical Contractors' Association as its representative on the Electric Fittings Statutory Committee in the place of Mr. H. C. Hazel, who, as we have already reported, has become inspector to the National Register of Electrical Installation Contractors.

Mr. M. Jeynes, A.M.I.E.E., who has retired from the staff of the Malvern Urban District Council's electricity works, has been presented with an easy chair and a framed photograph of himself and his colleagues. Mr. Jeynes has been at the works for nineteen years, and he is succeeded by Mr. Arthur Holt, who has been on the staff for twelve years.

Mr. E. F. Bacon, who, as reported in our last issue, has been appointed electrical engineer and manager to the Holmfirth Urban District Council, received his early electrical training with Messrs. Henry Berry, Ltd., Leeds, the Leeds University, and the Corporation Electricity Department. He subsequently held the successive appointments of assistant engineer, shift boiler engineer, and consumers' engineer in the Leeds electricity undertaking. He served in France during the War, and afterwards was appointed chief electrical engineer to the United Premier Oil Combine, Hull. From there he went to Colchester, to take up the position of commercial manager in the Electricity Department, and has been engaged on the development of the extended area of 270 square miles. He commenced duties at Holmfirth on Saturday last.

Mr. E. F. Bacon

Mr. W. H. Duffett, deputy engineer of the Rotherham Corporation Electricity Department, was recommended at a special meeting of the Electricity Committee for the position of engineer and general manager, in place of the late Mr. E. Cross.

Mr. F. R. Hodges, 180, High Street, Hull, has been appointed agent for the East Coast for the Vincent Switchgear Manufacturing Co., Ltd.

Mr. R. E. Shott, secretary of the Victoria Falls and Transvaal Power Co., has been elected a director of the company. Mr. Shott has been secretary since 1923, and has been in the service of the company for over twenty-one years.

Mr. S. J. Cork, of Hastings, has been appointed temporary mains assistant by the Dover Town Council during the change-over to bulk supply.

On the invitation of Callender's Cable and Construction Co., the North Midland Area Committee of E.D.A. visited Anchor Works, Leigh, on May 3rd. During the day the visitors were conducted over the works and witnessed the manufacture of all types of rubber insulated cables. The visitors, numbering about fifty, were entertained to lunch on the premises. The chairman of the Committee, Mr. Thomas Roles, of Bradford, in proposing a vote of thanks, acknowledged the courtesy of the company in providing the Committee with an opportunity of inspecting their processes and for the hospitality which they had enjoyed. Mr. J. Bowyer, general manager at Anchor Works, responded.

Mr. L. J. Kettle, M.I.E.E., M.I.Mech.E., consulting engineer to the Irish Free State Electricity Supply Board, was re-elected president of the Institution of Civil Engineers of Ireland for the session 1933-34 at the recent annual meeting held in Dublin.

Mr. A. T. Haywood has resigned from the staff of Veritys, Ltd., in order to take up the position of Midlands manager with Electrical Components, Ltd., of Birmingham.

Mr. H. J. Henwood, mains assistant, has been recommended by the East Ham Corporation Electricity Committee for the appointment of mains superintendent at a salary of £440 per annum, and **Mr. G. W. Ablitt,** meter engineer, as mains assistant at a salary of £377 per annum.

Mr. B. D. Cordiner, B.Sc., has been appointed assistant electrical engineer to United Engineers, Ltd., Singapore. A graduate of the University of Edinburgh, Mr. Cordiner received training with the Metropolitan-Vickers Electrical Co., Ltd., at Trafford Park and Sheffield, and since 1929 has been engaged as engineer with Messrs. W. F. Mitchell, consulting engineers, Edinburgh. Mr. Cordiner sails for Singapore on May 26th.

Messrs. E. E. Sharp and Everett on the occasion of the visit of the Meter and Instrument Section of the I.E.E. to the N.P.L. and Hampton Court

Mr. W. Whitelaw, chairman of the London & North Eastern Railway, has been elected president of the Institute of Transport for the session 1933-34. The vice-presidents elected include **Mr. T. E. Thomas,** general manager of the L.C.C. Tramways.

Cables and Wireless Appointments.—It is announced that Wing-Commander Sir Norman Leslie has been appointed joint managing director of Cables & Wireless, Ltd., Imperial & International Communications, Ltd., and their associated cable companies. Messrs H. A. White, managing director of Marconi's Wireless Telegraph Co., Ltd., and E. Wilshaw have been appointed to the boards of these companies, the latter to be chief general manager. Mr. J. J. Denison-Pender is to be

deputy chief general manager, Mr. N. C. Lawson general manager, and Mr. S. G. Farmer secretary.

Obituary

Mr. J. R. Lilleker.—The death occurred on May 6th, at his home, Acton Road, Arnold, Notts, of Mr. James Robinson Lilleker. Mr. Lilleker, who retired about eighteen months ago from the position of outside electrical engineer for the whole of the shops throughout the British Isles of Boot's Cash Chemists, Ltd., had been in failing health for some time. He was at one time with Messrs. Tasker Bros., of Sheffield, and served a period with the Sheffield Electrical Light & Power Co. In 1901 he was appointed mains engineer to the Rotherham Corporation electricity works. He rose to be deputy borough electrical engineer, and retired in 1921. Mr. Lilleker was sixty-one years of age, and leaves a widow and five sons. Three of the sons are in business as Lilleker Bros., Ltd., at Rotherham.

Mr. J. P. Buck.—The death occurred on April 25th, at the age of eighty-three years, of Mr. James Parker Buck, of Deeping St. James, Lincs. After leaving the army, in which he was with Lord Kitchener at Khartoum, he was appointed superintendent of the City of London Electric Lighting Co., a position which he held for about twenty years.

Mr. C. Batt.—The death has occurred, at the age of sixty-seven years, of Mr. Charles Batt, a former superintendent of postal telegraphs at Bournemouth.

Mr. R. Wilson.—The death occurred on April 26th of Mr. Robert Wilson, who, until his recent retirement, was partner in the firm of Wilson & Dickson, electrical engineers, Ayr. He was a well-known freemason.

Mr. E. A. Wilson.—Mr. Edward A. Wilson, chief civil engineer of the Metropolitan Railway, died in tragic circumstances on May 4th at the age of fifty-seven.

Mr. W. Cotsworth.—Mr. William Cotsworth, M.I.E.E., who died, aged sixty-two years, at his residence at Brooklands, Cheshire, on April 15th, after ten days' illness, was chief engineer to the Calico Printers' Association, Manchester. He was born in Manchester and was trained at Finsbury Technical College, London, under the late Prof. S. P. Thompson. He subsequently joined the staff of Messrs. Drake & Gorham, Ltd., was appointed country house superintendent, and later became manager of the Manchester office of the company. In 1902 Mr. Cotsworth joined the Calico Printers' Association as assistant to Mr. Newall, the chief engineer, whom he succeeded as chief on the latter's death. In March last year he retired, but was retained by the Association in an advisory capacity. He transferred from the associate class to full membership of the I.E.E. in 1912.

The late Mr. W. Cotsworth

Wills.—Sir John Jackson, O.B.E., late Deputy Chief Inspector of Factories, left £3,287 (net personalty £3,098).

Mr. G. W. Malcolm, managing director of the Salt Union, Ltd., left £16,899 (net personalty £11,678).

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Southern Areas Electric Corporation, Ltd.—Public company. Registered May 6th. Capital £170,000 in £1 shares. Objects: To acquire the undertaking of or shares in the Sussex Electricity Supply Co., Ltd., to carry on the business of financiers, suppliers of electricity, &c. The following persons have consented to be directors: S. G. Gates, 2, Harcourt Buildings, Temple, E.C.4, and C. W. Braithwaite, Lloyds Bank House, Wellingborough. Solicitors: Slaughter & May, 18, Austin Friars, E.C.

"Ros-Rol" Products Co., Ltd.—Private company. Registered April 27th. Capital, £1,000 in £1 shares. Objects: To acquire the business carried on by S. C. Dimitriou at 13a, St. Anne Street, Liverpool, as the "Ros-Rol" Products Company, to work and exploit patents connected with the "Ros-Rol" electric cooking machine, to adopt an agreement with the said S. C. Dimitriou for the sole rights of manufacture, sale, and distribution of the "Ros-Rol" machines and products throughout Great Britain and Northern Ireland; to carry on the business of confectionery machine manufacturers and distributors, manufacturing confectioners, bakers, &c. The subscribers are: G. S. Norris, 6, Rumford Place, Liverpool; S. Seropoulos, 9, Highville Road South, Liverpool; N. G. Vlissidis, 24, Manville Road, Wallasey; and S. C. Dimitriou, 9, Highville Road South, Liverpool. Secretary: G. S. Norris. Registered office: 13a, St. Anne Street, Liverpool.

Neon Installations, Ltd.—Private company. Registered May 5th. Capital, £1,000 in £1 shares. Objects: To carry on the business of fitters and manufacturers, importers and exporters of neon electric lights and signs, electrical signs, apparatus and lights, wires, cables, &c. The directors are: A. L. Josephs, 2, Carlton Mansions, West Hampstead, N.W.6, and P. Needham, 138a, Romford Road, Stratford, E.15. Registered office: 169, Regent Street, W.1.

Cooper's Neon Signs, Ltd.—Private company. Registered April 27th. Capital, £250 in £1 shares (100 ordinary and 150 7½ per cent. cumulative preference). Objects: To carry on business as manufacturers and installers of and dealers in neon advertising and lighting signs, &c. The subscribers are: Fredk. A. Cooper and Mrs. Ethel Cooper, both of 20, Harborough Road, Northampton. Registered office: 11, Murray Avenue, Northampton.

Palace Radio Co., Ltd.—Private company. Registered April 29th. Capital £400 in £1 shares. Objects: To carry on the business of electricians, radio and electrical engineers, etc. The directors are: V. J. Camp, "Brownston," Palace Avenue, Paignton, and two others. Registered office: 6, Madeira Villas, Palace Avenue, Paignton.

Returns of Electrical Companies

Sunbeam Electric, Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated April 25th, to secure all moneys due or to become due from the company to Barclays Bank Ltd.

Economic Transmissions, Ltd.—Capital, £400 in 2s. shares. Return dated January 13th, 1933. 2,879 shares taken up. £82 4s. paid on 322 shares, £205 14s. considered as paid on 2,057 shares. Mortgages and charges, nil. A return of allotments, made up to February 1st, 1933, shows a further 150 shares allotted for cash (plus 18s. per share premium).

Sifam Electrical Instrument Co., Ltd.—Capital, £1,000 in £1 shares. Return dated January 14th, 1933. All shares taken up. £4 paid, £996 considered as paid. Mortgages and charges: £2,000.

Kye Electrical, Ltd.—Capital, £25,000 in 20,000 preference shares of £1 each and 100,000 ordinary shares of 1s. each. Return dated January 13th, 1933. 12,502 preference and 92,500 ordinary shares taken up. £17,127 paid. Mortgages and charges, nil.

Electriclocks & Radio, Ltd.—Debenture dated April 11th, to secure £300, charged on the company's property, present and future, including uncalled capital. Holder: H. Wilson, 49, Great Allie Street, Aldgate, E.C.

General Cable Manufacturing Co., Ltd.—Particulars filed of £37,075 debentures authorised April 12th, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

Satisfaction to the extent of £36,225 on April 15th, of debentures authorised November 2nd, 1931, and registered November 16th, 1931.

Pontypool Electric Light & Power Co., Ltd.—Issue on April 21st of £500 debentures, part of a series already registered.

Thomas A. Rose & Son, Ltd.—Particulars filed of £1,000 debentures authorised April 6th, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £400.

Mann, Egerton & Co., Ltd.—Capital, £370,925 1s. in 250,000 preference and 85,389 ordinary shares of £1 and 64,611 ordinary shares of 11s. each. Return dated January 2nd, 1933. 210,415 preference and 64,611 11s. ordinary shares taken up. £205,045 paid on 191,434 preference and 13,611 ordinary shares. £47,031 considered as paid on 18,981 preference and 51,000 ordinary shares. Mortgages and charges, £24,369.

W. D. Willson, Ltd.—Capital, £1,500 in £1 shares. Return dated December 15th, 1932. All shares taken up. £1,500 paid. Mortgages and charges, nil.

J. Briggs Electrical Contractors, Ltd.—Capital, £5,000 in £1 shares. Return dated December 31st, 1932 (filed February 16th, 1933). 4,702 shares taken up. £4,702 paid. Mortgages and charges, nil.

Vulco Dry Battery Co., Ltd.—Capital, £8,000 in 1,500 preference and 6,500 ordinary shares of £1. Return dated January 5th, 1933. All shares taken up. £3,667 paid. £4,333 considered as paid. Mortgages and charges, nil.

Bamford Works, Ltd.—Capital, £5,000 in £1 shares. Return dated September 3rd, 1932 (filed April 22nd, 1933). All shares taken up. £5,000 paid. Mortgages and charges, £2,500.

Bann Syndicate, Ltd.—Capital, £10,000 in £1 shares. Return dated January 12th, 1933. 8,002 shares taken up. £8,002 paid. Mortgages and charges, nil.

G. & L. Electrical Supply Co., Ltd.—Capital, £1,000 in £1 shares. Return dated December 31st, 1932. All shares taken up. £2 paid. £998 considered as paid. Mortgages and charges, £2,000.

Simpsons Electricals, Ltd.—Two notices of the appointment of A. Hastings, of "Sheperdene," Kenver Avenue, N.12, as

receiver and manager (1) on April 27th, 1933, under powers contained in first debentures dated September 13th and 22nd, 1932, and (2) on April 30th, 1933, under powers contained in second debentures dated March 28th, 1933.

Steatite and Porcelain Products, Ltd.—Satisfaction in full on April 27th, 1933, of debenture in favour of Barclays Bank, Ltd., dated April 2nd, 1931, and registered April 15th, 1931. (According to the register of mortgages, the debenture registered April 15th, 1931, originally secured all moneys due to bank.)

Thomas A. Rose & Son, Ltd.—Issue on April 27th of £400 debentures, part of a series already registered.

Sussex Electricity Supply Co., Ltd.—The nominal capital has been increased by the addition of £102,200 in £1 shares beyond the registered capital of £20,000.

Bakelite, Ltd.—The nominal capital has been increased by the addition of £59,900 in £1 ordinary shares beyond the registered capital of £140,100.

City Notes

Johnson & Phillips, Ltd., held their annual meeting on May 4th, Mr. G. L. Wates (chairman) presiding. In presenting the report and accounts (ELEC. REV., April 28th, page 617), the chairman said that the cash at the bank was again increased. A substantial part of these funds was in Australia, and they had not seen fit to bring it back to England. They were advised that the Australian position was sound and likely to improve. The fall in the net profit as compared with the preceding year was due to a considerable reduction in the amount of business expressed in terms of sterling which they had handled during the year; this had been caused by the policy of restricted expenditure which had been followed by the Government, local authorities, and large industrial users of cable. This fall in the value of available business had synchronised with a further fall in the prices of raw materials, which at December 31st last were in many cases at record low figures. This meant that they had handled a much larger relative volume of goods in proportion to the turnover in money than in the previous year, but expenses naturally could not be correspondingly reduced. The automatic result of the restriction in volume of available business was over-production and the reduction of the margin of profit on work obtained. It inevitably increased competition, involving a progressive reduction in prices and profit. To handle this volume of business they had as much work to do in the factory and the office as when it represented twice the value. In these circumstances it was satisfactory to know that the actual number of individual orders booked during 1932 was in excess of the number received during 1931. Whereas the kVA output of the Transformer Department during last year was substantially in excess of the output during 1931 and 1930, and even in excess of the very good year of 1928, yet the value of this output was over 25 per cent. less than in 1928. The orders placed with firms manufacturing cables and erecting transmission lines during 1932 had been much below those placed in previous years.

Work in connection with the grid was drawing to a close. The large amount of work placed by the Central Electricity Board filled a gap created by the falling-off in normal industrial requirements but the general trade revival had not come along in time to compensate for its completion. During 1932 there was also a severe decline in value of orders for switchgear of the heavy type for home use, and transformer orders considerably declined. They, however, did a little better in both these departments than in the previous year, both in volume and value. The cry of economy had gone too far, and the Government's discouragement in the early months of 1932 of expenditure by local authorities and the larger industries had had the inevitable result of depressing business all round. If the Government, local authorities, and distributors of electricity would prove their confidence in the nation by putting in hand forthwith the many schemes of expenditure in connection with electrical development which were waiting to be proceeded with, business would immediately revive. In a large number of cases where residential areas were concerned, cables were put down at a time when electricity was considered a luxury, and they were accordingly of a size to deal with a relatively small lighting demand only. To-day in many districts the householder was not allowed to have even an electric fire because the cables were not of sufficient capacity. The time was ripe for the enlargement in many areas of the old distribution networks. It only needed the confidence of the supply undertakings to revitalise the industry. The main feeders of the grid system were now practically complete, but the provision of the l.p. feeders, including rural distribution, was still behindhand. If this work was universally developed, again there would be very large orders available for themselves and other cable makers. Another factor affecting the trade as a whole was the excess of equipment for the manufacture of cable and electrical plant which existed in this country. It was not for him to say whether it was possible to control such existing manufacturing facilities, but the problem was worthy of the most serious consideration by the industry as a whole.

Owing to steps taken during 1931, comparative results of their branches in Australia and South Africa during 1932 were better than in 1931. In both these territories they felt that they had passed the worst trading period, and that they might look forward to an improved position hereafter. In South Africa sales were definitely on the up-grade. The difficulties of trading in India were aggravated by the political situation. Their principal subsidiary companies owned the electricity undertakings at Dunoon in Scotland and Ringmer in Sussex. These had not yet made any contribution to them in respect of the capital invested, although they were both on a profit-earning basis. The Helens Bay undertaking, near Belfast, had been sold to the Electricity Board of Northern Ireland on terms which were satisfactory. They had acquired a large area of supply in the Westmorland district. This would involve a capital expenditure in the neighbourhood of £200,000, and would provide work for the company for some time. During the year under review they had explored a large number of possible lines of manufacturing development. The Permel Company, of Budapest, had for some time past been producing by a special process an enamelled wire, and they had acquired the rights for the British Empire in this wire. They had established at their Charlton works a small factory for its manufacture, which it was hoped would be in production within a few weeks. They had also acquired the manufacturing rights within the British Empire of the Haefely static condenser for power factor correction and hoped to have it on the market within a few months. Manufacture had already commenced of an improved storage water heater. They were studying a number of other developments in connection with the storage of electrical energy for heating and other domestic uses. None of these new activities was likely to affect substantially the 1933 figures, as they would not be in full production in time. As a result of the redemption of the outstanding 6 per cent. debentures and the creation of the new issue of £400,000 debentures they had ample liquid capital for all their requirements. It was impossible to prophesy what the future had in store, but already this year the sales were in excess of the figures for the corresponding period of last year, and this was a hopeful augury for the future.

Sir Philip Dawson, in seconding the resolution, referred to the inertia and ultra-conservatism displayed by many of the railways towards electrification. He said that it had been proved that wherever electrification was introduced it paid anything from 8 to 15 per cent. on the capital expended, and it seemed to him that that should be good enough for any railway.

The Oriental Telephone & Electric Co., Ltd.—Presiding at the annual meeting on May 9th, Sir A. Henry McMahon (chairman) in referring to the company's branches at Singapore and Mauritius, said that conditions continued to be very unfavourable in Singapore, and it was not surprising that, for the time being, a further decline in revenue and in the number of subscribers had to be recorded. During the past year the gross revenue had decreased by £6,340 and the number of exchange lines by 317. A certain measure of criticism had been directed again the subscription rates prevailing in Singapore, and the directors appreciated that the present flat rate system of charging instituted in earlier days had become obsolete and probably inequitable. Negotiations had consequently been opened with the Singapore Government, whose consent had to be obtained in such matters, for the substitution of a message-rate system of charging similar to that in force in this country. The decision of the Government had not yet been announced. The results of the year's working at Mauritius showed some improvement over those of the previous year, but neither in Mauritius nor in Singapore had any appreciable change in the economic situation occurred. With regard to their subsidiary companies, the Bombay Telephone Co. showed increases in exchange lines and gross revenue had been able to maintain the extra one per cent. dividend which was paid in 1931. The Bengal Telephone Corporation since its accounts up to the end of June, 1932, were published, had been making steady progress, and although the number of exchange lines working still showed a decrease over those of the year before, much of the loss had since been recovered. The Madras Telephone Co. continued to hold its own, and in addition to the usual dividend of 8 per cent., had declared for the past year a special jubilee bonus of one per cent. The Rangoon Co. continued to feel the effects of the general depression even more acutely than other places, and although the dividend had been maintained at 6 per cent. there seemed little prospect of any early revival there. Good progress had been made by the Hong Kong Co., in which they were interested through their subsidiary, the China and Japan Telephone Co., a further 877 exchange lines having been added during the year; the dividend of 10 per cent. had been maintained.

The British Power & Light Corporation (1929), Ltd., held its annual meeting on May 9th, Mr. H. A. Vernet (chairman), who presided, in the course of his speech said that the diminution in the earnings available was accounted for by two factors. For a considerable part of last year they had had outstanding new preference capital on which interest was accruing at the rate of 6 per cent. per annum, while the proceeds of the issue were only gradually absorbed in their business; the temporary balances resulting had brought in only the meagre interest rates obtainable for money on deposit. The second factor was found in the diminished dividend received from the North Wales Power Co. As to the subsidiary companies, the sales of the North Wales Power Co. continued to make satisfactory progress in view of the industrial conditions. In particular, sales to the L.M. & S. Railway for the shops at Crewe, which in 1931 had shown a notable decrease, had more than regained that decrease in 1932, and were substantially in excess of those for any previous year. Supplies to quarries on the other hand had shown a substantial decrease. The company's gross revenue was further affected by the rather poor rainfall, which, in the case of Maenturog power station, was more than 20 per cent. sub-normal. However, even in such a comparatively poor year as 1932, they still had 21 million surplus kWh available for metallurgical purposes against the normal commercial sales of 61 million kWh. Although the North Wales Co. had shown increased sales and revenue, there had been a large increase in the rates which the company had been called upon to pay, and this had resulted in a reduced dividend (from 4 per cent. to 3½ per cent.). The Electricity Distribution of North Wales and District was still making progress, and the English distribution companies continued to show a satisfactory increase in the number of consumers connected. Although the progress made was slower than they had anticipated, it was persistent and was continuing year by year, in spite of unfavourable trade conditions.

The Telephone Manufacturing Co., Ltd., held its annual meeting on May 9th, Mr. F. T. Jackson (chairman), presiding. In presenting the report and accounts (ELEC. REV., May 5th, p. 653), the chairman said that during the year they had been successful in increasing the turnover. The machine shops had been fully occupied, but the assembly shops had not been so busy in spite of the fact that they had purchased additional machinery to the full extent of the machine shop capacity.

They had decided to purchase an adjoining piece of freehold land to permit of factory extensions and so provide accommodation which would be suitable for the use of machinery on every floor. They had concluded arrangements with a subsidiary of the A.E.G., Berlin, to manufacture the "Hydra" condenser in this country and had considerably extended the types of public telephone apparatus which they manufactured. Their a.c. electric clocks had been perfected and were meeting with a steady demand. The additional factory space which would shortly be available would enable them to increase their production of this line. They had also completed an a.c. master clock, which was capable of running a large number of "slave" clocks in such places as public buildings and offices. The marine department continued to expand in spite of the depression in the shipbuilding industry. The development in "Bakelite" mouldings in the telephone industry, brought about by the adoption by the Post Office of these mouldings for telephone apparatus, had necessitated the installation of plant which would have to be extended as it had been working to full capacity ever since installation. The demand for telephone apparatus from the companies controlled by Telephone Rentals, Ltd., had been well maintained. They had brought out two new types of telephone instruments for installation by these companies, and their engineers were at the present time busy developing a new automatic system for the same purpose.

The Calcutta Electric Supply Corporation, Ltd., held its annual meeting on May 9th, Lord Meston (chairman) presiding. In presenting the report and accounts (ELEC. REV., April 28th, page 617), the chairman said they were looking back on another year of low vitality. The great jute industry of Calcutta, their dominant customer, was working far short of its normal capacity throughout the year; most of the other manufacturing concerns also suffered in one way or another, and domestic consumption, although it did not actually decline, failed to show the expansion to which they had become accustomed in more prosperous times. It also made a disappointing response to the reduction in the flat-rate charge which came into operation in June, 1931. For some time they had felt that a lightening of the tariff for their industrial supplies, corresponding to the reduction of the domestic rate in 1931, was becoming overdue. Their first step in this direction was to simplify the old two-part tariff into a single-unit rate on a sliding scale varying with the size of the load and with the load factor; this came into effect as an optional arrangement last November. The second step was a completely new and distinctly reduced scale of rates for h.p. power, which would take effect from the first of next month. It was hoped the new rates would bring new customers, but until these arrived and trade recovered, and particularly until the jute mills resumed more normal hours of working, they had to face a reduction in their revenue. To meet such a contingency they had already available a special reserve which was sanctioned in general meeting two years ago.

The Craigpark Electric Cable Co., Ltd., reports a profit for the year ended March 31st last of £8,487, as compared with £16,738 in the preceding year, which with £2,863 brought forward, together with £5,000 transferred from reserve, makes £16,350. After charging £7,262 for depreciation of land, buildings, machinery and plant, &c., it is proposed to pay a final ordinary dividend of 2 per cent., making 6 per cent. for the year (against 10 per cent.), and to carry forward £3,089. The lower profit is mainly accounted for by the very considerable and constant fall in selling prices throughout the year and particularly during the latter half. The slowing down of electrification schemes generally has increased competition for work, with the result that selling prices have been adversely affected in relation to costs. In addition, general trade has been affected by the adverse conditions prevailing. The new buildings referred to in the last report have now been completed, and additional plant has been installed. Meeting: May 12th.

The Société Financière de Transports et d'Entreprises Industrielles (Sofina) reports a gross revenue for 1932 of 110,400,286 fr., as compared with 153,976,685 fr. (Belgian) in the preceding year. The balance available for dividends is 94,415,971 fr. (against 114,636,175 fr.). The ordinary dividend is 400 fr. gross per share, or 360 fr. net (against 500 fr. gross and 450 fr. net), and 10,040,197 fr. is carried forward, against 9,361,175 fr. brought in. The report shows that the working results of the principal undertakings have been comparatively satisfactory, and that the output of electricity undertakings still compares favourably with that of other branches of industrial production. The report contains an exhaustive survey of the company's activities, and Mr. Dannie Heineman, in his review, deals with the policy which certain public authorities pursue towards concession-holding companies under their jurisdiction.

The Ever Ready Co. (Great Britain), Ltd., reports a profit for the year ended March 31st last of £343,473, as against £332,485 in the preceding year. To this is added £44,119 brought in, and after allocating £87,912 to reserves, and contributing £3,450 to the staff benevolent fund, there is a balance of £296,230. As announced in our last issue, the final ordinary dividend is 25 per cent., making 35 per cent. for the year, leaving £46,691 to be carried forward. The report states that the sales for the year increased by 24 per cent. During the year ordinary shareholders were offered 434,240 ordinary shares of 5s. each at 10s. per share. These shares were taken up. During the year new arrangements were made with regard to the company's business in Australia, and arising out of the agreement the company's selling agents subscribed for 25,000 ordinary shares at 18s. per share. Meeting: May 31st.

The Montevideo Tramway Co. has completed arrangements with the Government to pay now 1,000,000 pesos for street paving instead of spreading the payments over fifteen years. According to the Montevideo correspondent of *The Times*, as a result the Government has received a credit through the Atlas Electric & General Trust for payment of the Hallgarten loan interest which was due in New York on May 1st. The tramway company has obtained a number of advantages, including a promise from the Government to study the possibility of extending its concession.

The Beauharnois Power Corporation.—A plan for reorganising the financial structure of the Corporation, suggested by a Bondholders' Protective Committee appointed last year, was accepted by the common shareholders on May 4th. Under the plan the Montreal Light, Heat and Power Co. will underwrite $13,500,000 (about £2,700,000 at par) first mortgage bonds as an essential element of the financial rehabilitation of the Corporation. The scheme was accepted by a meeting of bondholders held prior to the meeting of common shareholders.—*Reuter* (Montreal).

The Cawnpore Electric Supply Corporation, Ltd., reports a net revenue for 1932 of £81,569, as compared with £79,297 in the preceding year. To this is added £6,100 brought in, making £87,669. After allocating £30,000 to depreciation and renewals, £6,000 to income tax account, and £9,063 to debenture sinking fund, it is proposed to pay a final dividend of 7 per cent., making 10 per cent. for the year (same), leaving £6,906 to be carried forward. The sales of electrical energy increased from 38,332,048 kWh to 43,454,825 kWh. Meeting: May 16th.

The St. Austell & District Electric Lighting & Power Co., Ltd., reports a net revenue for 1932 of £5,937. To this is added £2,595 brought in, and after providing for debenture interest, capital issue and preliminary expenses written off, &c., it is proposed to pay a final ordinary dividend of 5 per cent., making 10 per cent., less tax, for the year, leaving £3,324 to be carried forward.

Philips' Incandescent Lamp Works is contemplating a capital repayment to shareholders. According to the Amsterdam correspondent of the *Financial Times*, the possibility of a repayment of no less than 25 per cent. is at present being considered by experts. The issued capital of the company is £5,800,000 (at par) in ordinary shares and £1,750,000 in six per cent. preference shares.

The Elektrizitäts A.G. Vorm. Schuckert & Co., of Nuremburg, reports net profits of 1,678,000 marks for the year ended March 31st last, as compared with 1,534,000 marks in the previous year. Including the balance forward the amount available is 3,715,000 marks (2,036,000 marks in 1931-32) and a dividend of 5 per cent. is proposed. There was no distribution in 1931-32.

The London Electric Wire Co. & Smiths, Ltd., reports a profit for 1932 of £61,581, as against £63,249 in 1931, to which is added transfer fees and £22,774 brought in, making £84,385. It is proposed to pay a final ordinary dividend of 3½ per cent., making 5 per cent. for the year (same) and to carry forward £19,132. Meeting: May 12th.

Parkinson & Cowan, Ltd., announce that the arrears of preference dividend for the year ended September 30th will be paid. The preference dividend due on March 31st last was deferred pending the completion of the accounts to the end of 1932.

G. D. Peters & Co. report a net loss for 1932 of £39,879, as compared with a profit of £3,573 in 1931. The amount brought in is £9,137 and £40,000 is transferred from reserve. After deducting the loss and transferring £7,806 to reserve re subsidiaries, a balance of £1,452 is carried forward.

The Delhi Electric Supply & Traction Co., Ltd., has declared a final dividend of 8 per cent. on the ordinary shares, making 12 per cent., tax free, for the year.

Glenfield & Kennedy, Ltd., have declared a final dividend on the ordinary shares of 2 per cent., making 4 per cent., less tax, for the year (against 10 per cent.).

The Adelaide Electric Supply Co., Ltd., has declared an interim dividend of 4½ per cent., tax free, on the ordinary stock (same).

The Melbourne Electric Supply Co., Ltd., is again paying an interim dividend on the consolidated ordinary stock of 3 per cent., tax free.

Stocks and Shares

TUESDAY EVENING.

THE incessant changing of the international kaleidoscope that reflects economic conditions has the effect of giving to Stock Exchange business an unusual degree of animation. The happenings in Washington and New York during the short time that has elapsed since the U.S.A. went off gold have been, in themselves, sufficient to quicken speculative as well as investment interest. Commodity prices have been advancing rapidly. Together with this, the various base metals are in demand, tin and copper being leaders in the movement. The spirit of speculation is alive in Stock Exchange markets. People are buying industrials, mining shares, oil, rubber, and railway stocks. Some think that the movement is getting a little feverish, but, up to the present, the rises have been kept within sufficiently reasonable bounds to give no cause for apprehension. Investment securities are by no means overlooked. Although in their case the activity is more or less sporadic, the ordinary bread and butter business of daily investment goes on much in the same way as usual. Investors are undoubtedly becoming more concerned with the conservation of their capital than with the income that the latter affords. Heaviness in the prices of longer-dated gilt-edged stocks is the logical sequel to this consideration.

Dollar Stocks

The market in American stocks and shares made rapid upward headway towards the end of last week, until, indeed, an abrupt check was imposed by a wave of profit-taking. This had a sobering influence, the more so by reason of the fact that it came unexpectedly. Prices of dollar stocks are, however, better on balance. Consolidated Gas of Baltimore has risen to 65, Montreal common shares to 38. Canadian General preferred rallied to 55½, after being lower. Brazilian Tractions

are 2¼ up, at 13¼. Hydro Electrics have been a feature of strength with a jump to 8, from which there was a reaction to 7½. American Telephone & Telegraph, after being 130¼, came back to 127½. International Telephone & Telegraphs strengthened to 15½, but reacted a point.

Cables and Wireless

Further discussion of the half-year's dividend of 2½ per cent. declared by Cables & Wireless on the preference stock led to a little selling on behalf of people who professed that they had expected a full year's dividend payment to be made this month. So sanguine a view was not shared by the majority. When stock came in the price eased off to 82½. The "A" ordinary stock is a little harder at 28, and the "B" ordinary at 10½ shows a small improvement. Globe ordinary rose 10s. to 11½, upon declaration of a final dividend of 2s. per share, making 2 per cent. for the year net. This goes against nothing for 1931. The shares are of the nominal value of £10 each, and for many years received dividends of 10 per cent. per annum, paid free of tax.

Anglo-American Telegraph preferred at 103½ has gained a point. Telephone Rentals at 6s. and Telephone Manufacturing at 4s. are both a few pence to the good. Ferranti preference at 24s. show a gain of sixpence.

Home Railway Stocks

Fresh improvements have occurred in the prices of the Underground stocks and shares. Metropolitan consolidated strengthened to 74, Underground Electric ordinary shares are better at 20s. 6d. All the assented stocks, preferred, ordinary and deferred, of the Central London have advanced to the common level of 87½. Moreover, men in the market for these securities maintain that there is a more obvious willingness than has been apparent for some time past on the part of the public to take a hand in the Home Railway industry. The prejudice against what are still called steam stocks cannot be destroyed until traffic returns and earnings wear a different complexion from that which they present nowadays. But this does not, of course, apply to the Underground, and the ordinary shares make a useful speculative medium from the point of view of a buyer prepared to put them away and wait for a few months in the hope of making a profit. London and Suburban Traction preference shares have further risen to 17s. 6d., showing a 1s. gain. London United Tramway 4 per cent. debenture stock holds its rise at 75½.

Home Electricity Supply

Price movements in this department are of no great consequence. Brompton ordinary at 32s. 6d. have receded 6d., and in the Provincial list Bournemouth and Poole at 75s. are similarly higher. Richmonds (Surrey) are better at 53s. 3d. Chiswick shares remain at 48s., West Gloucestershire ordinary has hardened to 60. The newly issued shares of the Llanelly Company are the turn better at 4¼d. premium. North Metropolitan new shares are 6d. up at 17s. 6d. premium. Hendon Electric preference are good at 28s. 6d. British Light & Power ordinary have strengthened to 17s. 3d. The preference continue at 25s. 9d. A gain of 1s. raised Atlas Trust ordinary to 9s.; the preference drooped to 20s. 3d. There are on offer 2,000 County of London 6 per cent. preference at 30s. 6d., and 2,000 Yorkshire Electrics at 30s. There are not many shares available in this particular group, but, of debenture stock, £5,000 Edmundson's 4 per cent. can be obtained at 104½, also £5,000 London Power at 106¼ (free of stamp) and £10,000 General Electric 4½ per cent. at 108¼. A small line of Perak River Hydro-Electric 4 per cent. stock can be obtained at 100. The company's 5 per cent. debenture has risen this week some half a dozen points to 30.

Manufacturing and Equipment

The tendency in the market for manufacturing shares is towards slightly lower levels. This is due to the fact that popular fancy, which a little while ago was ardently searching for industrial shares likely to benefit from progress in industry, has now turned to others which stand to draw advantage from the improvement in the prices of commodities. Therefore shares such as Callenders, British Insulated, Henleys, and others of the same calibre are somewhat neglected for the time being, and the prices show an inclination to droop. General Electric ordinary strengthened to 41s. 3d., British Aluminiums to 26s. 3d. Johnson & Phillips at 18s. 3d. are ex the 5 per cent. dividend. The speech of the chairman at last week's meeting dealt with a wide range of matters affecting the industry, as well as his own company. The demand for shares in companies dealing with commodities is responsible for an improvement in rubber shares. This, although so far attracting no particular attention, is sufficiently marked to have raised prices considerably above those which prevailed a few months back.

Business Conditions

Base metal shares are also pursuing an upward path, with the result that shares in tin and copper mining companies have strengthened generally. In the iron and steel group, Babcock & Wilcox recovered a few pence to 32s. 6d., on repurchases, apparently by the short division, now that the dividend, with its reduction of 5 per cent. for the year, is known. Business in most of the Stock Exchange markets is tolerably animated, although the bursts of activity are of shorter duration than the stretches of quietude which constantly recur.

Share List of Electrical Companies

Home Electricity Companies.

	Nom.	Approx. Dividend. 1931.	1932.	Price, May 9.	Rise or Fall.	Yield. p.c. £ s. d.
Bournemouth and Poole	1	15	15	75/-	+6d.	4 0 0
Brompton Ordinary	1	8½	7	32/6	—6d.	4 6 2
Central Electricity 4½% Deb.	Stock	4½	4½	108	—	4 3 4
Charing Cross Ordinary	1	8½	7	33/6	—	4 3 7
Chelsea	1	8½	7	32/6	—	4 3 7
City of London	1	10	10	33/6	—	4 6 2
Clyde Valley	1	7	7	35/-	—	4 0 0
County of London	1	10½	10½	53/9	—	3 18 8
Edmundsons' 7% Pref.	1	7	7	30/6	—	4 11 10
Elec. Dis. Yorkshire	1	9	9	45/9	—	3 18 7
Elec. Supply Corporation	1	11	11	66/3	—	3 6 8
Kensington Ordinary	1	8	7	33/-	—	4 4 10
Lancs Light and Power	1	7	7	32/6	—	4 6 2
London & Home Counties 4½% Deb.	Stock	4½	4½	108	—	4 3 4
London Electric	1	9	7	32/6	—	4 6 2
Metropolitan	1	10	10	51/3	—	3 18 2
Midland Counties	1	7	7	35/-	—	4 0 0
Mid. Elec. Power	1	8	8	38/9	—	4 2 6
North Eastern Electric Ordinary	1	6	6	30/-	—	4 0 0
Do. 7% Pref.	1	7	7	35/-	—	4 4 10
Northampton	1	10	10	51/3	—	3 18 2
Notting Hill 6% Pref.	10	6	6	13½	—	4 10 7
North Met. Elec. 6% Pref.	1	6	6	30/-	—	4 0 0
St. James' and Pall Mall	1	8	7	32/6	—	4 6 2
Scottish Power	1	8	8	36/3	—	4 8 2
South London	1	8½	7	33/-	—	4 4 10
Urban Ordinary	1	7	7	37/6	—	3 14 8
Westminster Ordinary	1	8½	7	32/6	—	4 6 2
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	17/6	—	8 11 2
Yorkshire Elec.	1	8	8	43/3	—	3 14 3

Home Rails.

Central London Ord. Assented	Stock	4	4	87½	+2	4 11 5
Metropolitan	„	2½	1¾	74	+1	2 4 0
Do. District	„	4½	3	66½	—	4 10 3
Underground Electric	1	7	4½	20/6	+6d.	4 7 10

Telegraph and Telephones.

		1930	1931			
American Tel. & Tel.	$100	9	9	127½	—	7 1 6
Anglo-Am. Tel. Pref.	Stock	6	6	103½	+1	5 16 0
Do. Def.	„	1½	1½	24	—	6 2 5
Cables & Wireless 5½% Pref.	„	5½	2½	82½	—2	3 6 8
Do. A 7½% Ord.	„	—	Nil	28	+½	—
Do. B Ord.	„	—	Nil	10½	+½	—
Globe Tel. and T. Ord.	10	8½	Nil	11½	+½	2 3 6
Do. do. Pref.	10	6	6	11½	—	5 2 2
Great Northern Tel.	10	20	20	28	—	7 2 10
Marconi-Marine	1	15	10	28/9	—	5 4 4
Oriental Telephone Ord.	1	12	12	3	—	*4 0 0

Home and Foreign Trams, Etc.

Anglo-Arg. Trams First Pref.	5	—	—	1/9	—	—
Do. do. 2nd Pref.	5	—	—	1/9	—	—
Do. do. 5% Deb.	Stock	—	—	7½	+2½	—
British Electric Traction Def. Ord.	„	5	5	255	—	—
Do. do. Pref. Ord.	„	8	8	133	—	6 0 4
Brazil Traction	100	—	—	13½	+2½	—
Brit. Columbia Elec. Rly, Pce.	Stock	5	5	102½	—	4 19 6
London & Sub. Trac. 5% Pref.	1	Nil	Nil	17/6	+1/-	—
London United Tram Deb.	Stock	4	4	75½	—	5 6 0
Mexico Trams, 5% Bonds	—	5	5	26½	—	18 17 0
Mexican Light Common	100	Nil	Nil	9½	—	—
Do. 7% Pref.	100	7	7	15	—	—
Do. 1st Bonds	—	5	5	64½	—	7 15 0
Victoria Falls Ord.	1	15	15	4 15/16	+ 1/16	3 9 10
Yorkshire (West Riding)	1	Nil	Nil	6/-	—	—

Manufacturing Companies.

Assoc. Elec. Ord.	1	6	4	15/9	—	5 1 7
Do. Pref.	1	8	8	29/6	—6d.	5 8 6
Babcock & Wilcox	1	14	14	32/6	+6d.	5 10 9
British Aluminium Ord.	1	10	5	26/3	+ 1/16	3 16 0
British Insulated Ord.	1	15	15	67/6	—1/16	4 9 3
Brush Ord.	Stock	5	Nil	40	—	—
Callender's	1	15	15	2½	—1/16	5 4 2
Do. 6½% Pref.	1	6½	6½	28/9	—	4 10 5
Crompton Parkinson Ord.	5/-	30	24	21/6	—	5 2 4
Do. 8% Pref.	1	8	8	32/-	—	5 0 0
Edison-Swan 1st Pref.	1	7½	7½	24/6	—	6 2 5
Do. 5% Deb.	Stock	5	5	102½	—	4 17 7
Electric Construction	1	Nil	Nil	11/3	—	—
Enfield Cable Ord.	1	25	25	4½	—	5 11 1
English Electric	1	Nil	Nil	7/6	—	—
Do. do. Pref.	1	Nil	Nil	11/3	—	—
Ever Ready	5/-	35	35	28/-	—	6 5 0
Ferranti Pref.	1	7	7	24/-	+6d.	5 16 8
G.E.C. Pref.	1	6½	6½	29/9	—	4 7 5
Do. Ord.	1	10	8	41/3	+6d.	3 17 8
Henley's	1	30	30	6	—1/16	5 0 0
Do. 4½% Pref.	5	4½	4½	5½	—	4 5 9
India-Rubber	1	Nil	Nil	2/6	—	—
Johnson & Phillips	1	10	5	18/3xd.	+9d.	5 9 7
Siemens Ord.	1	7½	7½	26/3	—	5 14 3
Telegraph Construction	£1	Nil	Nil	18/3	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1931

810. "Electric lamps." G. H. F. Knight. October 9th, 1931. (390830.)

25256. "Electrical switchgear." Rossman Patents, Inc. October 6th, 1930. (390859.)

27359. "Machines for making mounts for electric incandescent lamps and the like." British Thomson-Houston Co., Ltd. October 1st, 1930. (390807.)

27943. "Electrical signal transmission systems." Electrical Research Products, Inc. October 8th, 1930. (390811.)

27944. "Telephonic and like transmission systems." Electrical Research Products, Inc. October 8th, 1930. (390812.)

27964. "Electrically insulated parts with metal inserts, and the manufacture thereof." Belling & Lee, Ltd., F. E. Davies, and A. G. Haslam. October 8th, 1931. (390813.)

27995. "Electric lampholders." J. L. Van Os. October 8th, 1931. (390815.)

28039. "Joint or terminal for electric cables." Standard Telephones & Cables, Ltd., T. R. Scott, and J. K. Webb. October 9th, 1931. (390817.)

28041. "Electrical measuring apparatus." Standard Telephones & Cables, Ltd., A. W. Montgomery, and V. J. Terry. October 9th, 1931. (390818.)

28122. "Electrical glow discharge lamps." Marconi's Wireless Telegraph Co., Ltd., G. F. Brett, and E. G. Herriot. October 9th, 1931. (390821.)

28137. "Signalling conductors." Electrical Research Products, Inc. October 30th, 1930. (Addition to 339968.) (390822.)

28142. "Remote control systems." Automatic Electric Co., Ltd., G. A. Burns, and P. F. Gunning. October 9th, 1931. (390823.)

28202. Sound recording." C. R. Keith, Electric Research Products, Inc., and Western Electric Co., Ltd. (Bell Telephone Laboratories Inc.) October 10th, 1931. (Cognate application 10160/32.) (390839.)

28275. "Impregnations of electric cables." Standard Telephones & Cables, Ltd., T. R. Scott, and J. K. Webb. October 12th, 1931. (390853.)

29137. "Telephone systems." Automatic Electric Co., Ltd. October 24th, 1930. (390868.)

29354. "Vapour electric discharge devices." British Thomson-Houston Co., Ltd. October 22nd, 1930. (390872.)

31132. "Electric circuit interrupters." Westinghouse Electric & Manufacturing Co. November 26th, 1930. (390879.)

31570. "Draw-out electric switchgear arrangements for duplicate busbar systems." G. S. Marston. November 14th, 1931. (390880.)

33649. "Induction electricity meters." Ferranti, Ltd., and C. F. Clifford. December 4th, 1931. (390885.)

33730. "Electrical signalling devices applicable specially for indicating vacant seats in cinemas, theatres, and like places." F. Angell. December 5th, 1931. (390886.)

1932

53. "Dry batteries." J. J. Pala. January 1st, 1932. (Addition to 19209/31). (390896.)

278. "Glands for electric cables and the like." British Insulated Cables, Ltd., W. R. Blades. January 5th, 1932. (390897.)

1113. "Systems of electrical connection and distribution." Ericsson Telephones, Ltd., and J. Gardner. January 14th, 1932. (390903.)

2328. "Electric furnaces." Birmingham Electric Furnaces, Ltd., and A. G. Lobley. January 26th, 1932. (Patent of addition not granted.) (390909.)

3143. "Vapour electric discharge rectifiers." Akt.-Ges. Brown, Boveri, et Cie. February 2nd, 1931. (390914.)

3233. "Imitation fuel for electric fires." H. H. Berry. February 3rd, 1932. (390916.)

3729. "Control of auxiliary machines in power plants." British Thomson-Houston Co., Ltd., D. E. Jewitt, and J. I. Hall. February 8th, 1932. (390918.)

4221. "Electric protective relays." Siemens-Schuckertwerke Akt.-Ges. February 12th, 1931. (390922.)

4467. "Magnetic cores for inductances." General Electric Co., Ltd., C. G. Smith, and S. V. Williams. February 15th, 1932. (390925.)

4639. "Electrical coupling arrangements for thermionic valve amplifiers." J. E. Pollak (C. Fichandler). February 16th, 1932. (390926.)

7978. "Luminous electric discharge devices for use in connection with high tension cables." J. B. J. M. Abadie. March 17th, 1931. (390938.)

9321. "Electrically operated gas lighters." Ever Ready Co. (Great Britain), Ltd., and E. F. Beeston. March 31st, 1932. (390947.)

9769. "Flash-light lamps and the like." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. October 19th, 1931. (390948.)

11620. "Echo altimeter apparatus for use on aircraft." British Thomson-Houston Co., Ltd. April 22nd, 1931. (390956.)

11643. "Electric railway systems." M. H. Loughridge. April 22nd, 1932. (390957.)

12992. "Direct current motor control." Forges et Ateliers de Constructions Electriques de Jeumont. June 1st, 1931. (Addition to 386009.) (390961.)

14417. "Moulding of insulating caps for joining electric conductors." Naamlooze Vennootschap Electriciteits Maatschappij Electro-Stoom, and H. Huizinga. May 20th, 1932. (390966.)

15609. "Thermionic valve circuits." H. Jackson. June 2nd, 1932. (390669.)

17457. "Loud speakers." W. W. Triggs (Ideal Werke Akt.-Ges. für Drahtlose Telephonie), June 20th, 1932. (390974.)

18851. "Means for regulating the reception in wireless apparatus." B. Piesker and W. Goy, Sen. March 7th, 1932. (390684.)

19584. "Gaseous electric discharge devices." International General Electric Co., Inc. July 9th, 1931. (390982.)

19964. "Electric brushes." E. Jones. August 17th, 1931. (390985.)

20070. "Thermionic amplifiers." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. August 1st, 1931. (390986.)

20909. "Electrical sound-recording apparatus." Radio Corporation of America. August 6th, 1931. (390992.)

22225. "Thermionic valves." Telefunken Ges. für Drahtlose Telegraphie. August 7th, 1931. (390998.)

23211. "Apparatus for recording electrical vibrations." British Thomson-Houston Co., Ltd. August 18th, 1931. (391006.)

23724. "Electric welding." British Thomson-Houston Co., Ltd. August 27th, 1931. (391011.)

25359. "Thermionic valves." Telefunken Ges. für Drahtlose Telegraphie. September 11th, 1931. (391021.)

27086. "Radio-electric musical instrument with keyboard and thermionic valves." E. E. Coupleux and J. A. M. V. De P. Givelet. November 12th, 1931. (Addition to 359967.) (391029.)

27411. "Electric cartridge fuses." D. Fridman. October 5th, 1931. (391032.)

30172. "Tuning devices for radio apparatus." F. E. A. Bambridge. October 27th, 1932. (390760.)

30522. "Suspending and insulating electric conductors." Electrical Improvements, Ltd., and J. R. Kennedy. October 31st, 1932. (391048.)

32282. "Carbon holder for electric arc lamps." N. J. Anderson and R. Rigby, Ltd. November 15th, 1932. (391059.)

35801. "Means for use in the reception of wireless signals." W. M. Farquhar. December 17th, 1932. (391077.)

36679. "Alarm systems for banks and the like." F. W. Hudson and W. H. Davidson. December 24th, 1931. (391079.)

1933

4334. "Electrical jointing clamps." Ericsson Telephones, Ltd., and J. Gardner. January 14th, 1932. (Divided application on 390903.) (391085.)

8003. "Electrical circuit breakers." British Electrical and Allied Industries Research Association, W. B. Whitney, and E. B. Wedmore. October 1st, 1931. (Divided application on 27384/31.) (390829.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be lodged within one month from May 3rd :—

Anka. No. 538489. Class 8. Electric cables. No. 538490. Class 40. Wire insulated or sheathed with india-rubber and used for electrical purposes.—Callender's Cable & Construction Co., Ltd., Hamilton House, Victoria Embankment, E.C.4.

Superite. No. 540312. Class 8. Electric cables. No. 540313. Class 40. Wire insulated or sheathed with india-rubber and used for electrical purposes.—W. T. Henley's Telegraph Works, Ltd., 11, Holborn Viaduct, E.C.1.

Dioprism. No. 539332. Class 13. Electric lighting fittings made of ordinary metal.—Dorman & Smith, Ltd., Ordsal Electrical Works, Middlewood Street, Salford.

Electric Lamps in Portugal

A CORRESPONDENT in Portugal draws our attention to an announcement appearing in the local Press to the effect that a new electric lamp, of Portuguese manufacture, under the trade mark of "Lumiar," is to be put on the market. The lamps will be manufactured by a concern known as the "Empreza Nacional de Aparelhagem Electrica."

The mere fact of a new factory or industry starting up in Portugal would not be sufficient in itself to disturb exporters of electric lamps to this market, but it is almost certain that, as a result, protection will be sought and obtained. Portugal is, however, still an agricultural country, and all her modern industries are young and most in a very imperfect condition. National products are bad when cheap, and when good are as dear, and in cases dearer, than foreign imported goods.

With regard to electrical goods generally, experience shows that goods so far produced in the country can only be classed as inferior. The human element enters too largely into delicate products of this nature to expect even the most perfect machinery to turn out goods entirely unaided. The native workmen work hard and do their best, at miserable wages, but they have not the mechanical mind, and it is difficult to produce perfect goods when machinery is attended by ignorant and illiterate workmen who do not know the first thing about the function of the rather complicated machines with which they are working.

So far there has been no announcement as to the prices at which these new Portuguese lamps are to be sold, but it is certain that they will not be much (if any) cheaper than foreign lamps. In the meantime, the importation of lamps cannot fail to be seriously affected, for if it is found that the consumer prefers the foreign lamp, then protection will be called for, and the price of the native lamp will not be reduced as a result.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Accrington.—Development of Ashlea Street Estate, Baxenden; G. Kirk.

Acock's Green (NEAR BIRMINGHAM).—Shops and flats, Gospel Lane (electrical installation); Broomhead & Green, builders, Kingstanding Road.

Ayrshire.—Extensions, St. Margaret's R.C. School, Ayr (£12,423); director of education, Ayr.

Barnstaple.—Electric lighting installation in 18 houses, Oakleigh Road; J. Cater & Sons, builders. Extensions, for Barclays Bank, Ltd.; Dudley Newman, Elliott & Archer, architects, Bedford Row, London, W.C.

Birmingham.—Extensions for Messrs. Cadbury Bros., Ltd., Bournville (electrical installation); W. J. Whittall & Son, Ltd., builders, 131, Lancaster Street. Restaurant, dance hall and café, 79, Edmund Street; H. S. Scott, architect, 115, Colmore Row.

Blackheath (WORCS).—Cinema, Halesowen Street, for W. Cooper.

Blackpool.—School baths, Whitegate Drive, for E.C.

Bolton.—Houses (28), Lever Hall Road; J. Markland. Houses (10), Almond Street; W. E. Yates.

Bootle.—Development of Fernhill Road Estate; W. R. Williams, Wavertree. Shops, Orrell Lane; Irving & Mosscrop, Liverpool.

Bournemouth.—Police quarters; F. P. Dolamore, borough engineer.

Bristol.—Houses (3,048), various estates (£1,075,000); city engineer. Flats for rehousing; C. W. F. Dening, architect.

Burnley.—Houses (134); borough surveyor.

Cardiff.—Shops, Grand Avenue; Ely Construction Co., Ltd. Extensions, Canton Branch Library (£1,190); city engineer. Improvements to Canton Cinema, Cowbridge Road and New Imperial Cinema, Queen Street; licensees.

Castle Bromwich (NEAR BIRMINGHAM).—Houses (24), Chester Road; H. Dare & Son, Ltd., builders, Alum Rock Road, Ward End, Birmingham.

Charing (KENT).—Houses (electrical work) for W. Johnson Timson, Westwell Limeworks; J. J. Clayson, builder, Lyminge.

Colchester.—School (200 places), Harwich Road; director of education.

Congleton.—Houses (150), West Heath, for H. E. Rohll.

Cumberland.—Additions to Workington Technical School and Whitehaven Secondary School; J. Forster, architect, 4, Alfred Street, North, Carlisle.

Darlington.—Bus station for the United Automobile Services, Ltd.; W. L. Wallis, architect, 20, Victoria Square, S.W.1. Extensions to the tramcar shed; E. Minors, borough engineer.

Dorking.—Houses (16), Middle Street, Brockham; G. J. Arthur & Sons, builders, 2A, High Street.

Dudley.—Technical college (£74,177), for Staffordshire E.C.; W. J. Whittall & Sons, Ltd., contractors, Lancaster Street, Birmingham.

Eccles.—Houses (100), Haddon Road, and library, &c., Winton; borough engineer. Works extensions, Monton Fields Road; E. Taylor, Ltd.

Egham.—Coach station, Denham House; U.D.C. surveyor.

Erdington (NEAR BIRMINGHAM).—Shops and flats, Coton Lane; Hillier, Parker, May & Rowden, architects, 27, Maddox Street, W.1. Shops, for Jones & Croxford, 29, Waterloo Street; Hartley Smith & Son (Contractors), Ltd., Birmingham.

Exeter.—Nurses' hostel, Royal Devon and Exeter Hospital; secretary.

Finedon.—Electric lighting installation at Parish Church.

Fraserburgh.—Extensions, Academy (£2,300); county architect, Aberdeen.

Glasgow.—Houses (922), Blackhill; architect, Housing Department. Cinema (1,400 seats), Sinclair Drive; E. Sutherland, architect, 102, Bath Street. Shops; Bryden & Robertson, architects, 278, St. Vincent Street.

Gloucester.—School, Coney Hill Road housing estate; director of education.

Goole.—Additions to flour mills, for Hudson, Ward & Co., Ltd.; F. Turner, architect.

Herefordshire.—School, Weobley; county architect, Hereford.

High Wycombe.—Houses (25), Healey Street, for A. W. Cousens.

Hinckley.—Houses (20), Middlefield Lane Estate; F. Garner & Son, builders, Loughborough Road, Leicester.

Ilkeston (DERBYSHIRE).—Bakery department, for the Co-operative Society, Ltd., South Street; F. Ogden, architect, 34, Irongate, Derby.

Inverness.—Houses (104); burgh surveyor.

Ipswich.—Houses (93), Curriers Lane (£23,065); Building & Public Works Construction Co., Ltd. Houses (50), Tower Ramparts clearance; borough engineer.

Irish Free State.—(COOTEHILL, CO. CAVAN).—Houses (16); P. J. Brady, engineer, Courthouse. (DUBLIN).—Houses (16), Gaeltacht Park, for St. Mobhi Public Utility Society, Ltd.; J. Johnston, secretary, 9, Bachelor's Walk. (SLIGO).—Houses (134), (electric lighting installation); borough surveyor, Town Hall.

Lancashire.—Infants' school, Higher Irlam (electrical installation); S. Wilkinson, county architect, 16, Ribblesdale Place, Preston. Extensions, Council School, Rimington Road, St. Helens (electrical installation); J. Yearsley & Son, Ltd., builders, Fenton Street, St. Helens.

Ledbury.—Houses (30); W. F. Bickford, U.D.C. surveyor.

London.—(CAMBERWELL).—Extensions, Poor Law Hospital (£15,973); W. H. Gaze & Sons, Ltd., Kingston. (HAMMERSMITH).—Dairy premises, Alexandra Road, for Wiltshire Creameries, Ltd.; Crowe & Careless, architects, Garden Court, E.C.4. (HORNSEY).—Town hall and offices, Crouch End (£100,000); borough surveyor. (LEWISHAM).—Block of shops, High Road; H. A. Scrase, architect, St. Helen's Place, E.C. (LEYTON).—Church, Emmanuel parish (£6,500); Rev. B. C. Garcia. (WIMBLEDON).—Extensions, factory, Wandle Park; Connolly Bros (Curriers), Ltd.

Malton (YORKS).—Water supply scheme with electrical plant (£9,244); Silcock & Simpson, engineers, Leeds and London.

Manchester.—School, Crosslee; G. & W. Smith (Builders), Ltd. Reconditioning Victoria Hotel; Peace & Norquoy, Ltd.

Middlesbrough.—Houses (160); J. McCreton, builders. Houses (30); Stephen Coats, Ltd., builders.

Morley (YORKS).—Additions to premises of A. C. Watson, Field Mills, Little Fountain Street; L. C. Hirst, architect, Exchange Buildings, Queen Street.

Mossley (LANCS).—Artificial silk factory, Union Mill, Roaches, for a syndicate; Alderman J. Ogden.

Newburn-on-Tyne. Cinema, shops and offices, Tyne View, Lemington; Cowe & Lawson, architects, Central Chambers, Chester-le-Street.

Newcastle-on-Tyne.—Indoor bowls club for the Northumberland Bowls Club (£7,000); J. W. Taylor, architect, St. John Street.

Northfleet (KENT).—Houses (20), Mitchell Avenue, for R. Hopkins & Sons. Houses (14), Lime Avenue, for C. J. Howard.

Norwich.—Factory for P. Haldinstein & Sons, Queen Street; Buckingham & Berry, architects, 43a, Prince of Wales Road.

Plymouth.—Development of Pounds Estate, Weston Park Road; H. J. Hammick. Extensions, Plymouth College; Governors.

Pontefract.—Extensions, General Infirmary (£9,000); Brown & Lodge, builder. Extensions, Monkhill Works; W. R. Wilkinson & Co., Ltd.

Preston.—Greenlands Junior School with electrical installation (£7,163); John Dillon & Son, builders, Heatley Street. Alterations to branch premises of the Midland Bank, Ltd., 81, Church Street; Whinney, Son & Austen Hall, architects, 37, Norfolk Street, W.C.2.

Rawtenstall.—Houses (12), Bridleway; S. Barnes.

Rochester.—Cinema, with dance hall, &c. (electrical work), for Southern Proprietary Holdings, Ltd.

Romford.—Houses (42), Rainham; W. E. Walsham, Ltd., builders.

Rotherham.—Printing works extensions, Perdy Street; H. H. Edmunds.

Rugby.—Extensions, Hospital of St. Cross (£7,000); Wm. Taylor Loveday, architect, 2a, Lawrence Sheriffe Street.

Scarborough.—Café at the Mere (£1,300); A. W. Sinclair & Sons, builders.

Shipley.—Houses, Crag End Estate (60) and Carr Lane Estate (40); U.D.C. surveyor. Houses (32), Glenside Road; J. & P. Obank. Houses (96), Wrose Road; H. Ogden.

Skegness.—Cinema, Grand Parade (£15,000); J. Wills & Sons, architects, Algitha Road.

Southall.—Houses (28), Delamere Road; Hayes Bridge Estate, Ltd. Houses (30), Longford Avenue; G. Wimpey & Co., Ltd. Estate development, Avenue Road; Plaistowe & Sons. Development of Butterfly Estate; Property Development & Construction Co., Ltd. Development of Viaduct Field Estate; Vigers & Co. Factory extension, Scotts Road and Brent Road; Crown Cork Co., Ltd.

Southend-on-Sea.—Extensions, tramway depôt; R. H. Dyer, borough engineer.

South Shields.—Pavilion for the South Shields Cricket, Tennis and Rugby Football Club (£3,500); F. W. Newby, architect, 37, King Street.

Stirling.—Branch premises for the Co-operative Society, Ltd., Barnton Street; Simpson, McMichael & Davidson, architects, 16, King Street.

Sunderland.—Swimming baths, Newcastle Road (£30,000); T. P. Collinge, borough engineer, Town Hall.

Surrey.—Laundry, Farnham Institution (£11,539), for the P.A.C.; clerk, Kingston-on-Thames. Two schools, Cuddington, and central school (360 places), St. Helier Estate, Morden, for County E.C.

Sutton Coldfield.—Houses (24), Whitehouse Common Road: Mrs. E. E. Wright.

Torquay.—Extensions, Prince's Hotel, Park Hill Road; Mrs. O. P. Stone.

Wakefield.—Works extensions, Calder Vale Road; Crystal Spring Co.

Wallsend-on-Tyne.—Alterations to premises, Station Road and Holy Avenue, for the Britannic Assurance Co., Ltd.; Harris & Sheldon, architects, Stafford Street, Birmingham.

Walsall.—Houses, Great Barr; borough engineer.

Warrington.—Houses (146), Thelwell Lane; borough engineer.

Warwick.—Maternity and other wards, Warneford Hospital; C. M. C. Armstrong, architect, High Street.

West Ashford (KENT).—Houses (46), various parishes; E. A. Jackson, architect, 13, North Street.

West Ridinz.—School (£6.900), Ferry Fryston; director of education, Wakefield.

Weymouth.—Development of Bellfield House Estate: V. Smith, architect, Station Road, Horley, Surrey. Church, Westham Bridge: G. Drysdale, architect, 17, Buckingham Street, London, W.C. Houses (12), Gipsy Lane; K. Openshaw, builders, Ardlin Rodwell.

Whitby.—Houses (34); R. A. Wilson & Sons, builders.

Worcester Park (SURREY).—Church, Stoneleigh Housing Estate; Rev. S. Buy Brockington, vicar of St. Philip's Church.

Workington.—Five shops and flats, Murray Road; J. H. Murray.

Worthing.—Houses (15), Seamill Park Crescent; L. W. Macer & Co. Houses (19), Sunningdale Road; Southwick & Downsview Estates Building Co. Houses (12), Sunny Close; C. W. Fielder. Cinema, Liverpool Gardens; Odeon (Worthing), Ltd. Alterations to Picturedrome, Chapel Road; A. T. W. Goldsmith, architect.

Wrexham.—Houses (100), Spring Lodge Estate; Lockwood, Abercrombie & Saxon, architects, Cathedral Chambers, Chester.